32nd Year AUGUST, 1948

RUBBER AGE

Rodform Unads

The DUSTLESS form of

Tetramethylthiuram Monosulfide

Disperses easily and quickly

RODFORM UNADS is another of the new Vanderbilt products designed to eliminate dust in the factory.

R. T. VANDERBILT CO. INC.

230 Park Avenue, New York 17, N. Y.

Build top performance into your products with

NEOPRENE LATEX

In many products, neoprene latex has established new performance standards. Because only with neoprene latex can you get *all* these advantages:

- **Toughness and durability**
- **Sunlight resistance**
- **Excellent aging**
- **Flame resistance**
- **Oil resistance**
- **Low permeability to gases**

Individual types of latices are available to fit your specific product and plant requirements. In your plant you will find that the neoprene latices are:

- **Stable in storage**
- **Stable during compounding**
- **Stable during processing**
- **Adaptable to normal manufacturing methods**
- **Free from precure**

REPORT 48-1 contains more information on the currently available neoprene latices. Extra copies are available. Write: E. I. du Pont de Nemours & Co. (Inc.), Rubber Chemicals Division, Wilmington 98, Delaware.

DU PONT RUBBER CHEMICALS

E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Del.

DU PONT

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BETTER THINGS FOR BETTER LIVING...THROUGH CHEMISTRY

THE RUBBER AGE, published monthly by The Palmerton Publishing Co., Inc., Printing Office, East Stroudsburg, Pa. Editorial and Advertising Offices at 250 West 57th Street, New York 19, N. Y. Entered as second class matter October 20, 1933, at the Post Office at East Stroudsburg, Pa., under the Act of March 3, 1879. Subscription in United States, $3.00 a year; Canada, $3.50; Foreign, $4.00. August, 1948. Vol. 63, No. 5.

TWO NEW HYCAR AMERICAN RUBBERS

Hycar OR-25 EP *(Easy Processing)*
Hycar OR-25 NS *(Non-Staining)*

HERE are two new American rubbers, both with superior processing characteristics. Hycar NS and Hycar EP differ only in that a special anti-oxidant has been used in the NS, making it non-staining and non-discoloring. This is an outstanding quality, particularly desirable in the fabrication of light colored products. The new Hycar rubbers have all these advantages over the regular process Hycar OR-25:

1. They band on the processing mill speedily—cut mill mixing time.
2. Better extrusion characteristics—less nerve and less heat build-up.
3. Excellent high temperature mixing.
4. Better fusion and mold flow characteristics.
5. Increased building tack for laminated products, such as frictioned stocks and calendered sheeting.

Both rubbers retain those properties which make Hycar American rubbers so usable for so many products . . . permanent resiliency and superior resistance to oil, abrasion, and aging. Ask your supplier for parts made from Hycar. Or write to Dept. HB-8, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio.

Hycar
Reg. U.S. Pat. Off.
American Rubber

B. F. Goodrich Chemical Company
A DIVISION OF THE B. F. GOODRICH COMPANY

GEON polyvinyl materials • HYCAR American rubber • KRISTON thermosetting resins • GOOD-RITE chemicals

SAFE...

(from abrasion)

WITH PHILBLACK O!

Philblack O could win on abrasion resistance alone! In addition, he has a sky-high batting average on resistance to cut and crack growth. Make no mistake about it . . . Philblack O has what it takes for Big League performance! Speed! Stamina! Endurance! Versatility! Teamwork!

Careful tests have been made comparing Philblack O with various other carbon blacks. These findings have been outstanding! You too, will like the results you get with this new HAF (High Abrasion Furnace) black...place an order for Philblack O, *right away!*

PHILLIPS PETROLEUM COMPANY

Phillips 66

Rubber Chemicals Division

EVANS SAVINGS AND LOAN BUILDING · AKRON 8, OHIO

Together - never to part

. . . and demonstrating several of the advantages of Geon polyvinyl resins

HERE'S a collar-liner, different from any ever made before. It promises you a *really* non-wilt collar —non-wilt not only when the shirt is new but till the shirt is worn out. The liner is made of sheeting produced from Geon polyvinyl resins in a special formulation . . . and it literally fuses with the cloth to make the collar. Textile and lining actually become one . . . and every washing and every ironing tends to make the fusion even more lasting.

So now another product reaches the market, benefits the consumer and cuts manufacturing cost, thanks to the versatility of Geon polyvinyl resins. Geon has been performing service like this in so many fields: it has made upholstery resistant to grease, wear and weather . . . has added to the beauty and wear of women's handbags . . . made the bell-cords on buses stronger . . . beautified kitchens and made curtains and tablecloths easier to keep clean. Perhaps you, like this collar manufacturer, will get new ideas from knowing Geon's many *combinable* characteristics.

Geon polyvinyl resins can be worked in almost every way, too. They can be molded, cast into sheets, extruded or used in calendering or impregnating. The color range is almost limitless. We make no finished products from Geon, but we are glad to supply information and to give help on any special problem. Write to B. F. Goodrich Chemical Co., Dept. R-8, Rose Bldg., Cleveland 15, Ohio. In Canada: Kitchener, Ontario.

Press-Fuse collar lining by J. P. Frank & Company, Inc., New York, N. Y.

B. F. Goodrich Chemical Company

A DIVISION OF THE B. F. GOODRICH COMPANY

GEON polyvinyl materials • HYCAR American rubber • KRISTON thermosetting resins • GOOD-RITE chemicals

Good-rite
VULTROL
for use in American rubber compounding
to prevent scorching, and for recovering
scorched stocks
GOOD-RITE AND VULTROL REG T M U S PAT OFF

For technical data please write Dept. CB-8

B. F. Goodrich Chemical Company

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ROSE BUILDING, CLEVELAND 15, OHIO

GEON polyvinyl materials • HYCAR American rubber • KRISTON thermosetting resins • GOOD-RITE chemicals

Biggs

VULCANIZERS and DEVULCANIZERS Have Served the Rubber Industry for More Than 45 Years

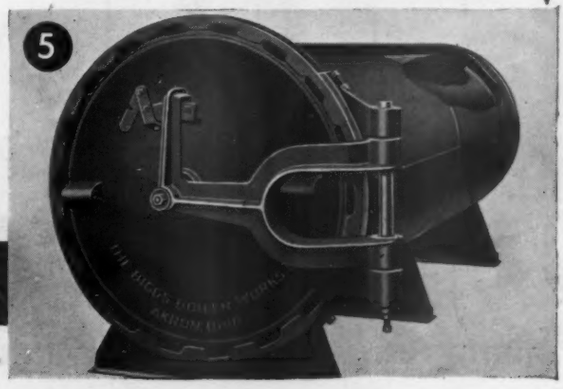
Fig. 1—15-ft. diameter by 45-ft. long horizontal vulcanizer with quick-opening door for vulcanizing rubber linings in large storage tanks. *Fig. 2*—Biggs vulcanizer with special heating manifolds and circulating fan; all sizes, various working pressures.

Fig. 3—vertical vulcanizer with quick-opening door. Door is handled by self-contained arm and gear-operating mechanism. Hand or motor operation.

Fig. 4—high pressure heavy duty jacketed vertical devulcanizer with special agitator. Furnished in various sizes.

Fig. 5—horizontal steam-jacketed vulcanizer with hinge type quick-opening door; all sizes, for various working pressures. Welded construction throughout.

BIGGS-built vulcanizers and devulcanizers have occupied a prominent place in the development of the rubber industry since its inception. For more than 45 years Biggs has furnished single-shell and jacketed vulcanizers both vertical and horizontal, as well as many different types of devulcanizers to meet various requirements of the reclaim experts. . . . It is a far cry from the old days of bolted doors and riveted construction to Biggs modern all-welded units with quick-opening doors. Biggs vulcanizers and devulcanizers are available in all sizes and for various working pressures — with numerous special features. *Write now for our Bulletin 45.*



BIGGS-WELD STRONGER THAN THE PLATE ITSELF EST. 1887

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1007-A BANK ST., AKRON 5, OHIO, U. S. A.

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Practical!

Pelletex for clean economical bulk handling of SRF from General Atlas plant to your Banbury.

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Herron & Meyer of Chicago, Chicago
Raw Materials Company, Boston

GENERAL ATLAS CARBON CO.
PAMPA, TEXAS • GUYMON, OKLA.

PELLETEX

H. N. Richards Company, Trenton
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Note—Molded articles courtesy
The Wooster Rubber Company

FOR MOLDED ITEMS IN COLOR SPECIFY PLIOLITE S-6

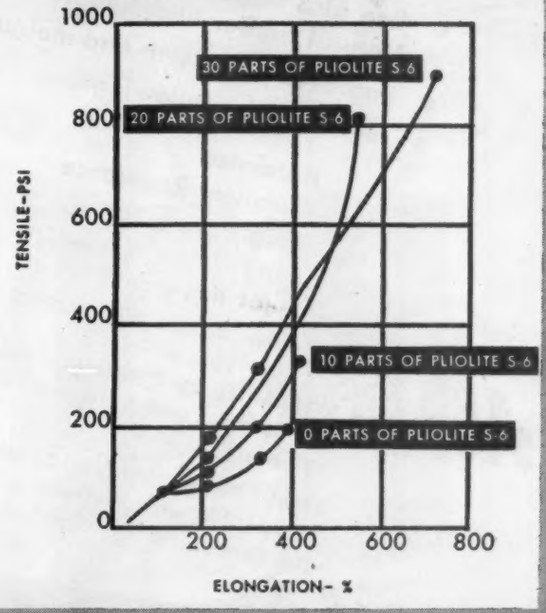
THESE bright-colored molded rubber products have the toughness and hardness of the best reinforced rubber stocks—yet they contain no carbon black.

That's because they have been stiffened by **Pliolite S-6,** Goodyear's incomparable reinforcing agent. The result is, these items are durable enough to withstand all kinds of abuse.

Pliolite S-6 is well adapted to all compounds needing a light-color, low-gravity stock of 70-100 durometer hardness with good processing characteristics and moldability. Its reinforcement is positive—coupling extra hardness with negligible loss in elongation. Often elongation is improved. It increases flex-life, tear-and-abrasion-resistance. It is the outstanding, colorless, reinforcing material.

Pliolite S-6 is effective with GR-S, Neoprene, Buna N and natural rubber. It is available as a powder for your own mixing, or in master batches in whatever rubber you select. For complete information and sample, write: Goodyear, Chemicals Division, Akron 16, Ohio.

Stress-strain curve for unfilled GR-S reinforced with PLIOLITE S-6 shows the added length and strength contributed by this superb reinforcing agent



Pliolite—T.M. The Goodyear Tire & Rubber Company

GOODYEAR

Synvarite RC-Resins

FOR RUBBER COMPOUNDING

SYNVAR RESINS

- Compatible with Buna N and GR-S types of rubber
- Can also be used advantageously with Natural rubber and Neoprene
- Improves processing and molding
- Improves the following:

  Hardness
  Chemical Resistance
  Toughness
  Abrasion
  Heat Resistance
  Mechanical Properties

Manufacturing Phenolic, Urea and Resorcinol Resins for all Industries since 1939

Also— SYNVARITE RC Resins and Solutions for Rubber Cements and Adhesives. Excellent Solvent Release.

Liquid Resins, SYNVAROL AND SYNVAREN, compatible with Synthetic and Natural Latices for Cements and Adhesives.

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Wilmington 99, Delaware

United Blacks

Plainly and distinctively colored designations make United bags for each type of carbon black easy to identify . . . another advantage in using United Blacks.

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KOSMOS 20—DIXIE 20, an SRF type carbon black, possesses perfect balancing of all component properties essential to satisfactory rubber performance; outstanding for ease of processing, good plasticity, fast rate of cure, high resiliency, and low heat build-up.

DIXIE 40—KOSMOS 40, an HMF type carbon black with these properties—cool mixing, smooth and rapid extrusion, fast rate of cure, high resistance to cut-growth, flex cracking and abrasion. Produced by a special process this furnace type black is especially useful for tires, tubes, footwear, and mechanical goods.

KOSMOS 50—DIXIE 50, an HMF type black, made by a new United process, in specially designed furnaces from carefully selected fuel. Featured by ease of mixing, ready dispersion, fast extrusion, low shrinkage and fine appearance of stock, also a quick curing black, yielding high modulus and tensile.

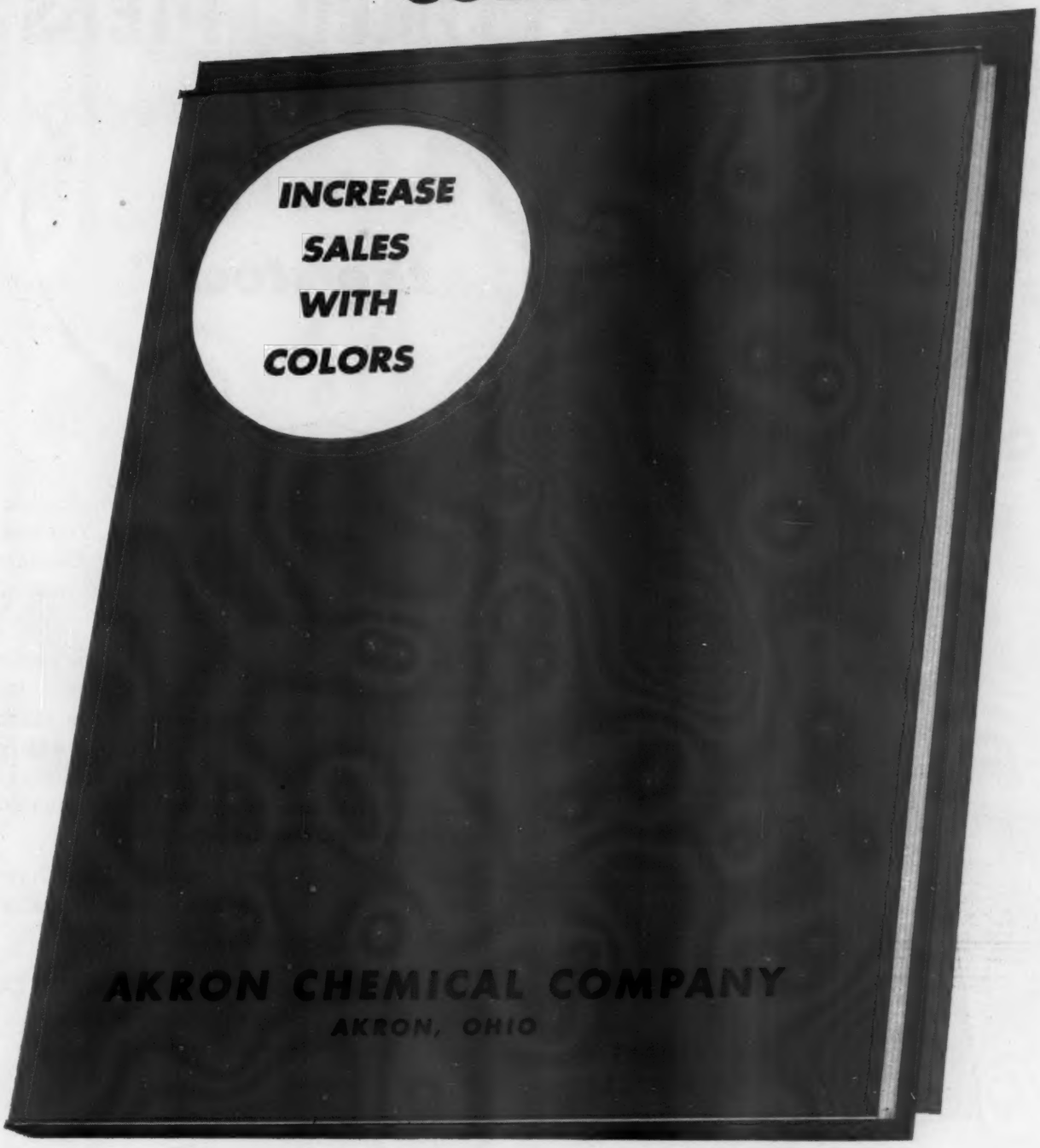
DIXIE 60—KOSMOS 60, an RF type black, new, different, and better. A fast curing black requiring low acceleration, it has been acclaimed for faster and smoother processing, high extrusion efficiency, less rejects at tuber, low shrinkage, glossy smoothness, dense appearance, freedom from ragged edges and for outstanding reinforcement for resistance to tread wear.

RESEARCH DIVISION

UNITED CARBON COMPANY, INC.

Charleston 27, West Virginia

What are your COLOR PROBLEMS?



Each Color Manual is tailored for the individual customer.

For 18 years Akron Chemical Company has helped customers meet a wide variety of color requirements. If you have a specific problem, why not let us solve it for you? A complete color laboratory and compounding service is available to you. Give us the problem; we'll give you the answer.

AKRON CHEMICAL COMPANY 255 Fountain St. Akron 4, Ohio

MR. CLIMCO SAYS.....

"CLIMCO LINERS *separate perfectly from the stock"*

Stock adhesions at any point in production mean time lost and extra expense. You can avoid such headaches by using Climco Processed liners that can be readily peeled from the stock without sticking.

Climco Processing of your liners assures many other profitable advantages: Liner life is greatly increased, tackiness of the stock is preserved, and gauges are more easily maintained. Latitude in compounding is enlarged, lint and ravelings are eliminated and horizontal storage is facilitated.

Since 1922 Climco Processed Liners have proved their worth to the rubber industry. Give them a trial in your plant.

THE CLEVELAND LINER & MFG. CO.
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ILLUSTRATED LINER BOOKLET
Tells all about Climco Liners and Linerette and how to get better service from liners. Write for your copy now.

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Treatment Contains
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PROCESSED LINERS
Serving the Rubber Industry for 26 Years

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METHOCEL

is back in carload quantities!

Methocel (Dow Methylcellulose) is used successfully in the rubber industry as a thickening agent for the control of viscosity in latices and for the creaming of latices. Methocel, a cold water soluble cellulose ether, is compatible with most rubber dispersions. Other significant advantages are its uniformity and purity and its ability to produce the creaming effect, quite readily. Methocel is available for shipment *now*. Take advantage of its unique properties. Write to Dow for more detailed information about Methocel and its uses in the rubber industry.

METHOCEL ADVANTAGES

1. Methocel is compatible to an unusual degree with a wide variety of modifying agents including alcohols, wetting agents, plasticizers and resins.
2. Methocel is odorless, harmless.
3. Methocel solutions ordinarily do not require preservatives.
4. Methocel is a uniform, synthetic chemical product.
5. Methocel solutions are neutral.
6. Methocel solutions remain clear and colorless over a wide pH range.
7. Methocel is completely soluble in water.

THE DOW CHEMICAL COMPANY • MIDLAND, MICHIGAN

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DOW

CHEMICALS INDISPENSABLE TO INDUSTRY AND AGRICULTURE

6 BIG ADVANTAGES..

make this attachment Indispensable!

..the Akron-Standard STOCK BLENDER

TIRE manufacturers testify, "Once used, never without". Handling labor is reduced. Operation is automatic until the milled stock is removed. Speed up your operation and enjoy more uniform stock production through these six features:

1. Manpower goes further. One workman can run two or more mills. No more laborious hand blending and warm-up.
2. Temperature reduced by passing compound or batch overhead. Cooler stocks permit adding accelerators without scorching.
3. Positive bank control with lower power consumption.
4. Correct milling time for every batch.
5. Less mixing time (or larger batches proportionately).
6. Uniform operation, uniform plasticity, uniform dispersion.

Ask for our 40-page Bulletin "A-8" describing this and many other profit-earning types of Akron-Standard equipment.

The Akron Standard Mold Co.

1624 Englewood Avenue — *"The Established Measure of Value"* — Akron 5, Ohio, U. S. A.

STABILITY . . . Marvinol VR-10 is superior in resistance to heat, light and other normally destructive factors.

VERSATILITY . . . Marvinol VR-10 is easy to process . . . may be calendered, extruded, injection molded, used in non-aqueous dispersions, formulated as unplasticized rigids . . . uniquely versatile.

TOUGHNESS . . . Marvinol's high molecular weight offers you extra toughness and "dryness" with long life . . . resists tear, wear, oils, acids.

MARVINOL®—vinyl resin for modern high-speed equipment offers you all these advantages

WIDER TEMPERATURE RANGE . . . Marvinol VR-10 assures you products that show less deformation due to heat . . . gives greater low temperature flexibility.

EASILY CLEANED . . . Marvinol-based products are easily and quickly cleaned because of their smooth surface. They're waterproofed, unaffected by mold or fungi.

The New Ultra-Modern Marvinol Plant contains the latest equipment to assure efficient operation, uniform production of the highest quality. Send today for details. Write on your company letterhead to Chemicals Division, Dept. R-8, The Glenn L. Martin Company, Baltimore 3, Maryland.

COLOR . . . Marvinol offers many opportunities for distinctive coloring . . . from clear to delicate or brilliant shades.

CLOSE COOPERATION . . . The Glenn L. Martin Co. compounds and fabricates only in its customer service laboratory for your benefit. We sell only raw materials. Our sales engineers and modern customer research laboratory are ready to help with your processing problems.

Martin Marvinol

RESINS, PLASTICIZERS AND STABILIZERS PRODUCED BY THE CHEMICALS DIVISION OF

THE GLENN L. MARTIN COMPANY • AN INTERNATIONAL INSTITUTION

"BETTER PRODUCTS, GREATER PROGRESS, ARE MADE BY MARTIN"

RECIPE

Test No. 8367—LPG from the Barrett Rubber Research Laboratory

FOR

BLACK EXTRUDED and MOLDED GR-S COMPOUND

of 80 Shore A Durometer Hardness

RECIPE	WEIGHT BASIS
GR-S Standard	100.0
BRS 700 Rubber Softener	**30.0**
Channel Black (EPC)	50.0
Furnace Black (MT)	100.0
Zinc Oxide	3.0
Stearic Acid	2.0
"BLE" 25	1.0
Sulfur	2.0
"Santocure"	1.0
TOTAL	289.0
Mooney Viscosity (Large Rotor) 4 minutes at 212° F.	75
Specific Gravity	1.30
Rubber Hydrocarbon, % by Wt.	34.6
Rubber Hydrocarbon, % by Vol.	48.6

Mooney Scorch Test Data at 250° F. (Small Rotor)

MINUTES	VISCOSITY
1	35
5	33
10	35
15	42
20	56

Cure at 316° F. (70 lb.)—10 Minutes

Tension and Hardness Data:	Unaged	Aged 24 Hrs. at 100° C.
Stress @ 300%, psi	1150	—
Stress @ 500%, psi.	1300	—
Tensile, psi.	1450	1550
Elongation, %	600	260
Permanent Set, %	26	9
Hardness, Shore A	80	95
Tear Resistance, Angle	285	135
Crack-Growth Resistance, Ross, Kilocycles per 500% Crack Growth	—	198.5
Abrasion Resistance, duPont cc. Loss per hp-hr.	475	390
Compression Set, 40% Constant Deflection, %	53.3	—
Impact Resilience, Goodyear-Healey Rebound Pendulum, % Rebound	31.1	39.4

THE SUPERIOR SOFTENING and extending characteristics of Barrett* BRS 700 rubber softener will assist the compounder in the design of molded and extruded stocks for the production of quality products at low cost.

BRS 700 RUBBER SOFTENER has a mild accelerating effect which promotes short curing cycles and yields relatively resilient vulcanizates with tight cures. The compound may be safely processed, as illustrated by the Mooney Scorch Test Data.

BRS 700 RUBBER SOFTENER permits the use of relatively high filler concentrations, yielding compounds with low shrinkage and excellent processibility, and insuring smooth and rapid extruding properties. In automotive and aviation parts, in tubing and belting, and in other mechanical items, the use of BRS 700 rubber softener provides economy with quality.

Barrett*

THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N. Y.

*Reg. U. S. Pat. Off.

Guide to Better Processing of RUBBER AND PLASTICS MATERIALS

This NEW, 8-page bulletin provides an outline of the latest types of equipment available for mixing, warming, sheeting, calendering and extruding rubber and plastics materials.

In this handy publication, you will find illustrations and brief descriptions of Banbury mixers, which automatically control mixing procedure . . . four kinds of extrusion experts . . . designed-for-the-job mills . . . calenders to fit your needs exactly . . . and rolls for many purposes. Tables are included showing sizes and capacities of standard Banburys and roll mills. One page is devoted to Farrel power transmission equipment — speed reducing and speed increasing gear units, right angle drives and Gearflex couplings. FB-476

Write today for your copy of Bulletin 187. No cost, no obligation.

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ANSONIA, CONN.
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Sales Offices: Ansonia, Buffalo, New York, Boston, Pittsburgh, Akron, Chicago, Los Angeles, Tulsa, Houston

FARREL-BIRMINGHAM COMPANY, INC.
ANSONIA, CONN.

Please send me a copy of Bulletin 187 "F-B Machinery for the process industries."

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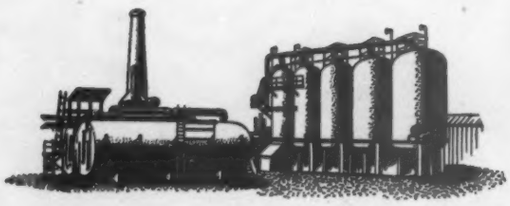
Company .....

Address .....

City ..... *State* .....

Working for and with

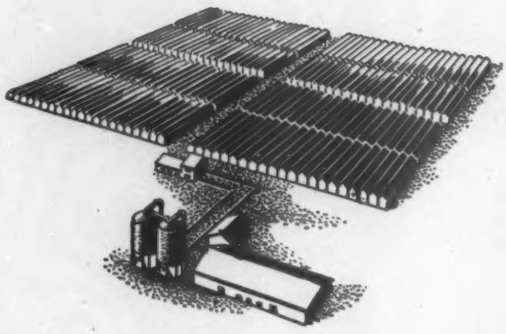


1. BASIC PRODUCTS

As fundamental as reinforcement and vulcanization are Witco's compounding ingredients for the rubber industry. These basic materials can be depended upon for their carefully controlled quality:

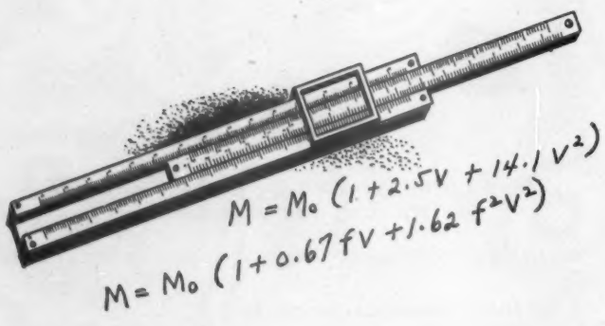
Carbon Blacks
Witcarbs* (precipitated calcium carbonates)
Stearites* (hydrogenated stearic acids)
Zinc and other Metallic Stearates
White Pigments, Colors
Clays, Whitings, and other Extenders
Mineral Rubbers and Softeners

*Reg. U. S. Pat. Off.



2. BASIC RESEARCH

Witco's efforts are not confined to the production and quality control of its products. Contributions to general knowledge of the behavior of rubberlike materials and, in particular, of pigments in rubber are contained in papers such as the following:



The Mechanism of Reinforcement of Elastomers by Pigments. *India Rubber World*, December, 1947.

The Effect of Pigments on the Hardness of Natural and Synthetic Rubber. *Rubber Age*, July, 1948.

The Effect of Pigments on Elastomer Properties. *Proceedings London Rubber Technology Conference*, June, 1948.

WITCO CHEMICAL COMPANY

Manufacturers

the Rubber Industry...

3. TECHNICAL SERVICE

Witco's Technical Service Laboratory was established to serve you and to help solve your application problems. Publications covering the properties and behavior of specific Witco materials include:

Witco Pigments in Rubber—Bulletin 47-1
Witco Stearates—Bulletin 46-1 (Third Edition)
Witcarb R—Bulletin 46-2
Witco Products (Fifth Edition, 1948)
Witco No. 30: A New Softener—Report R-6
Reinforcing Furnace Blacks—Report R-5
Continex FF—Report R-4

4. STRATEGIC LOCATIONS

Witco maintains four well-equipped laboratories, ten modern plants, and strategically located offices and warehouses throughout the United States and in England . . . to provide the fullest possible service to the rubber industry.

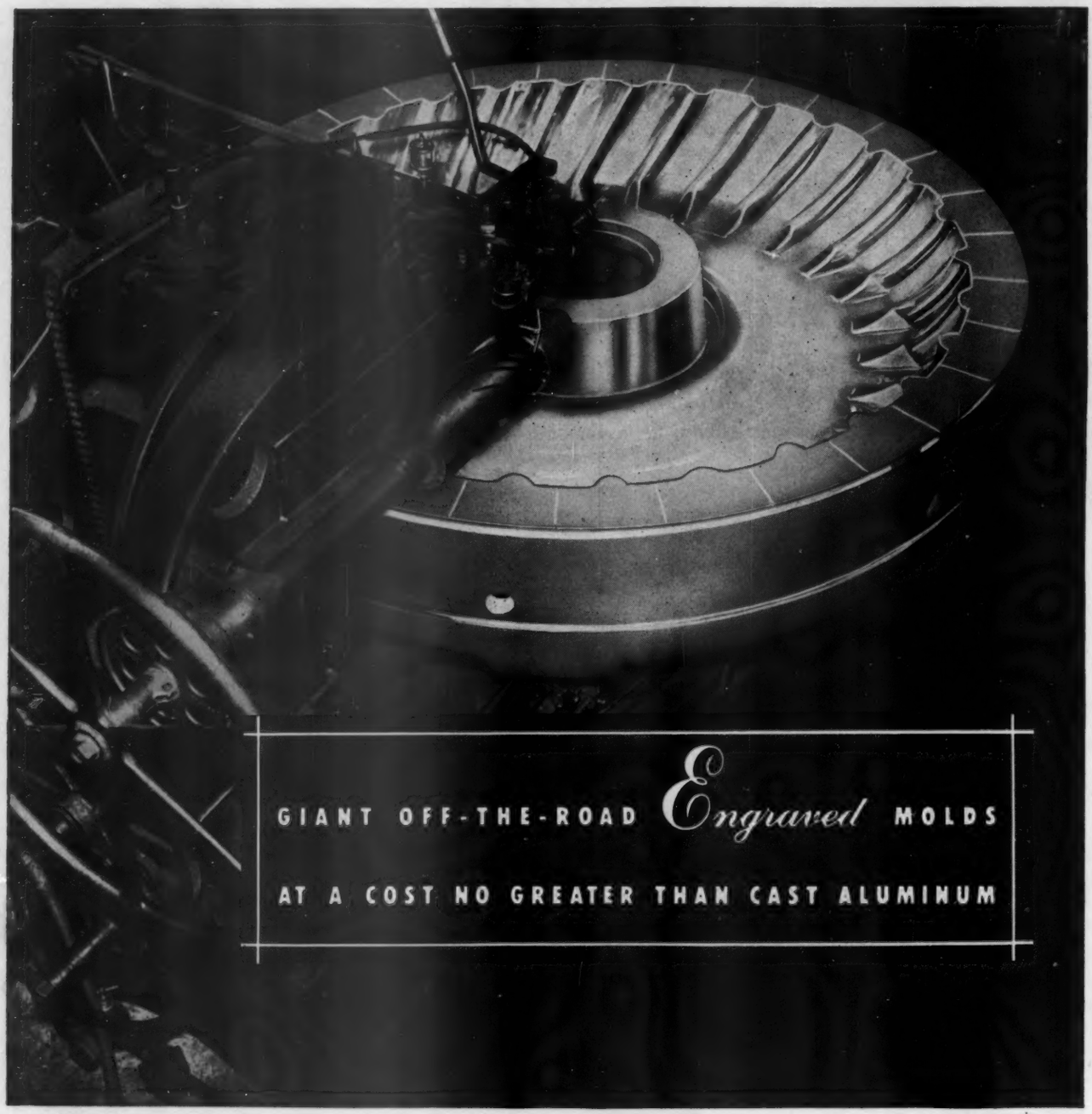
OFFICES: New York, Chicago, Akron, Boston, Cleveland, Detroit, Amarillo, Los Angeles, San Francisco; London and Manchester, England.

LABORATORIES: Chicago (research); New York (technical service); Sunray, Texas (carbon black research); Brooklyn (stearates research).

PLANTS: Sunray, Texas (3); Witco, Texas (2); Witco, New Mexico; Perth Amboy, New Jersey; Chicago and Lawrenceville, Illinois; Brooklyn, New York.

295 Madison Avenue, New York 17, N. Y.

and Exporters



PRIOR to the development by BRIDGWATER of large, power-fed engraving machines, cost dictated the use of cast aluminum molds for giant off-the-road tires, despite the recognized superiority of engraved molds.

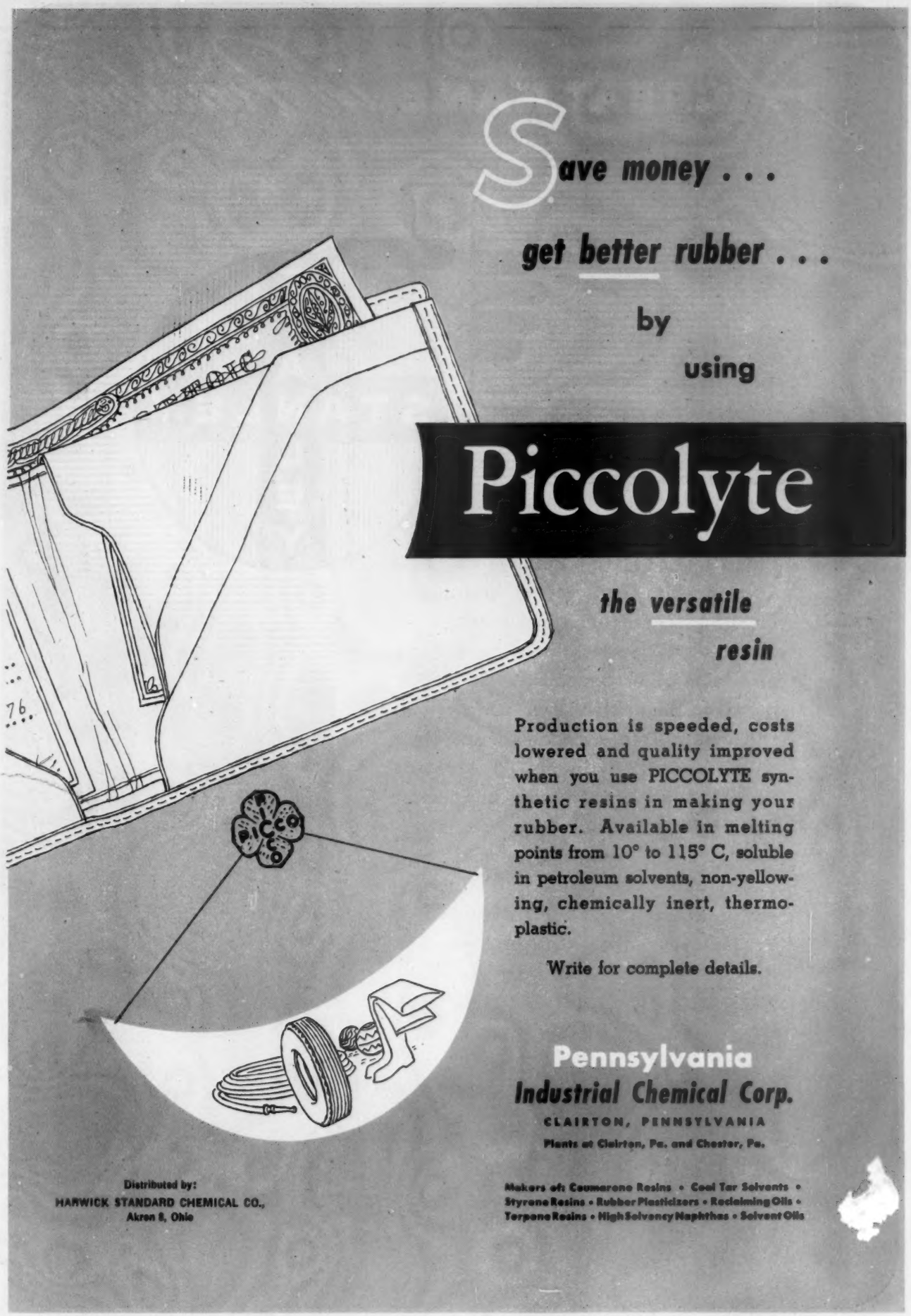
Today BRIDGWATER makes available to tire manufacturers engraved steel molds for many types and styles of giant agricultural and off-the-road tires at a cost often less, and certainly no greater than cast aluminum molds.

These large engraved molds possess the same accurate template fit to all characters and ribs in the design, the same precise corners, the same highly polished surface characteristic of *all* molds by BRIDGWATER.

THE BRIDGWATER MACHINE COMPANY

Akron, Ohio

FOR BETTER MOLDS FOR BETTER TIRES *SPECIFY* BRIDGWATER



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get better rubber . . .

by

using

Piccolyte

the versatile

resin

Production is speeded, costs lowered and quality improved when you use PICCOLYTE synthetic resins in making your rubber. Available in melting points from 10° to 115° C, soluble in petroleum solvents, non-yellowing, chemically inert, thermoplastic.

Write for complete details.

Pennsylvania

Industrial Chemical Corp.

CLAIRTON, PENNSYLVANIA

Plants at Clairton, Pa. and Chester, Pa.

Makers of: Coumarone Resins • Coal Tar Solvents • Styrene Resins • Rubber Plasticizers • Reclaiming Oils • Terpene Resins • High Solvency Naphthas • Solvent Oils

Distributed by:
HARWICK STANDARD CHEMICAL CO.,
Akron 8, Ohio

A GREAT NAME *in Finishes*

FOR 25 YEARS the Stanley Chemical Company has been creating and manufacturing special industrial coatings. In one case the special finish gave extra protection to base metals. In another it preserved highly polished surfaces. In still another, it took the form of unusually durable enamel. *"Special Finishes for Special Applications"* is big business at Stanley for, in our large research laboratories, highly trained specialists have solved hundreds of difficult finishing problems every year for our customers. Perhaps you have such a problem. Tell us about it . . . chances are we can help.

STANLEY CHEMICAL COMPANY, EAST BERLIN, CONN.

STANLEY CHEMICAL

INDUSTRIAL COATINGS

LACQUERS SYNTHETICS JAPANS ENAMELS

for Your Convenience...

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  - Accelerator 49

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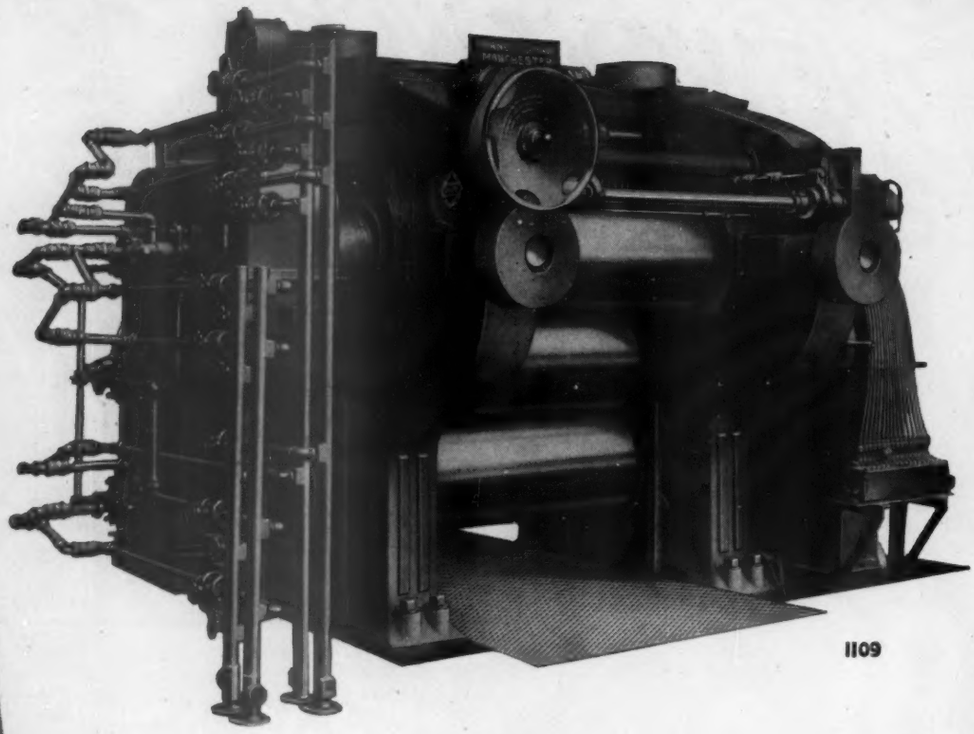

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The Calender shown has four rolls 68" long by 24" diameter, arranged to give even or friction speeds. The off set, top and bottom rolls can be adjusted by motor or by hand. Oil lubrication is provided from the oil pump to all parts which run continuously. Grease gun lubrication is provided to the more static moving parts. Where high temperatures are used for plastic materials our calenders are equipped with flood lubrication to the bearing blocks.

We supply the auxiliary equipment such as warmers, drying and cooling drums, batch-up and let-off gear, etc.

SHAW

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R 163

*Calcene T

...as a replacement for carbon blacks where color is desired in natural rubber stocks

*®

The increasing desirability for light colors in natural rubber products which have heretofore been confined to black has prompted the collection of data comparing the values of Calcene T with those of Thermax and P-33 carbon blacks. Compounders will find this data helpful in formulating stocks possessing the required characteristics for specific products.

DATA AVAILABLE COMPARING CALCENE T, THERMAX AND P-33

Just write for Columbia Pigments Data Sheet No. 48-1—"Comparison of Calcene T, Thermax and P-33 in Natural Rubber." Pittsburgh Plate Glass Company, Columbia Chemical Division, Fifth Avenue at Bellefield, Pittsburgh, Pennsylvania.

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Have You Tried PROTOX-166 in Your Processing

PROTOX-166 is the Zinc Oxide that has the successful combination of properties for providing improved processing of both synthetic and natural rubber at lower cost. The increase in apparent density of this pigment permits mixing of larger master batches on the Banbury Mixer and on the roll mill.

Because it is treated with propionic acid,* *Protox-166* mixes more rapidly and more easily and the quality of the dispersion obtained is very much better. These mixing qualities mean lower mixing costs and measurably less power consumption.

Being slow-curing, *Protox-166* permits more latitude in accelerator concentration, and provides for cooler running stocks on the calender and in the tuber. Besides, calender shrinkage, extrudability and Mooney plasticity data demonstrate the more desirable properties of *Protox-166* over other Zinc Oxides.

If you have not tried *Protox-166* in your processing, let us know and we'll gladly send additional data and a sample for trial.

TO GET ALL These Advantages

1. Bulks about two-thirds of the volume of XX-4
2. Improves processing (incorporates more rapidly with better dispersion)
3. Permits larger master batches
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5. Has lowest moisture pick-up of all brands of Zinc Oxide
6. Gives good modulus, tensile, tear resistance, and heat build-up properties
7. Lowers power consumption and mixing costs

*U.S. Patents 2,303,329 and 2,303,330

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Maximum activity.

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The Story of an American Raw Material

by JOHN M. BALL

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4. Miscellaneous Reclaiming Processes
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6. Scrap Rubber
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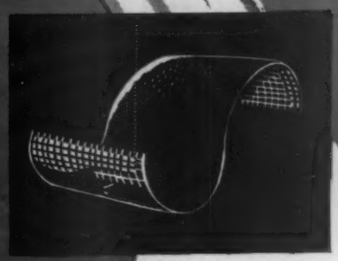
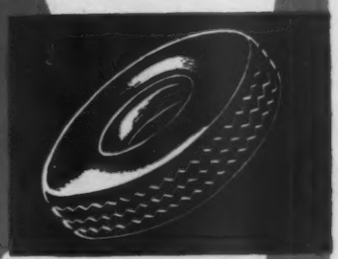


● Flintkote Sealants are widely used for fabric sizing, and in the Rug and Carpet industry to improve wear and appearance of the finished product.



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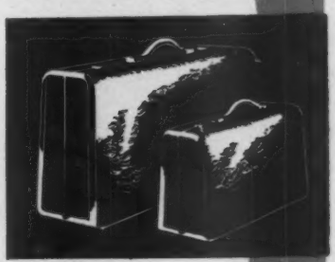

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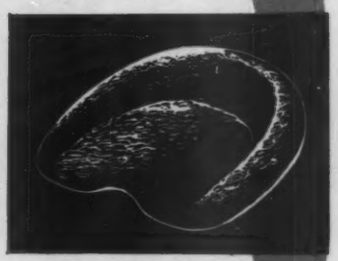

● Flintkote Binder Compounds are helping many fabricators speed up their production. Among the uses of such compounds are curled hair (above) and glass fibers.

● Out of Flintkote research flows new *utility* for elastomers. With it, come advantages in performance and *use* to manufacturers and processors.

Flintkote has applied research to many compounding problems. And, as a result, offers a wide line of rubbers, resins, latex compounds and asphalts, both as aqueous dispersions and solvent cements.

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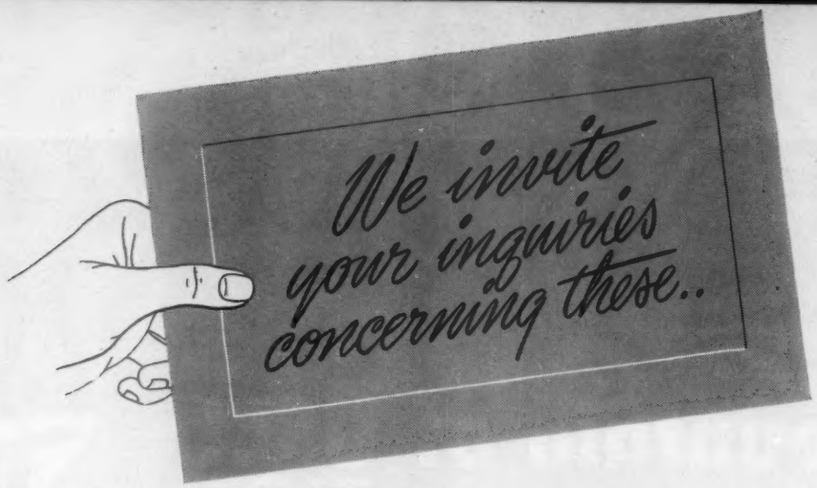
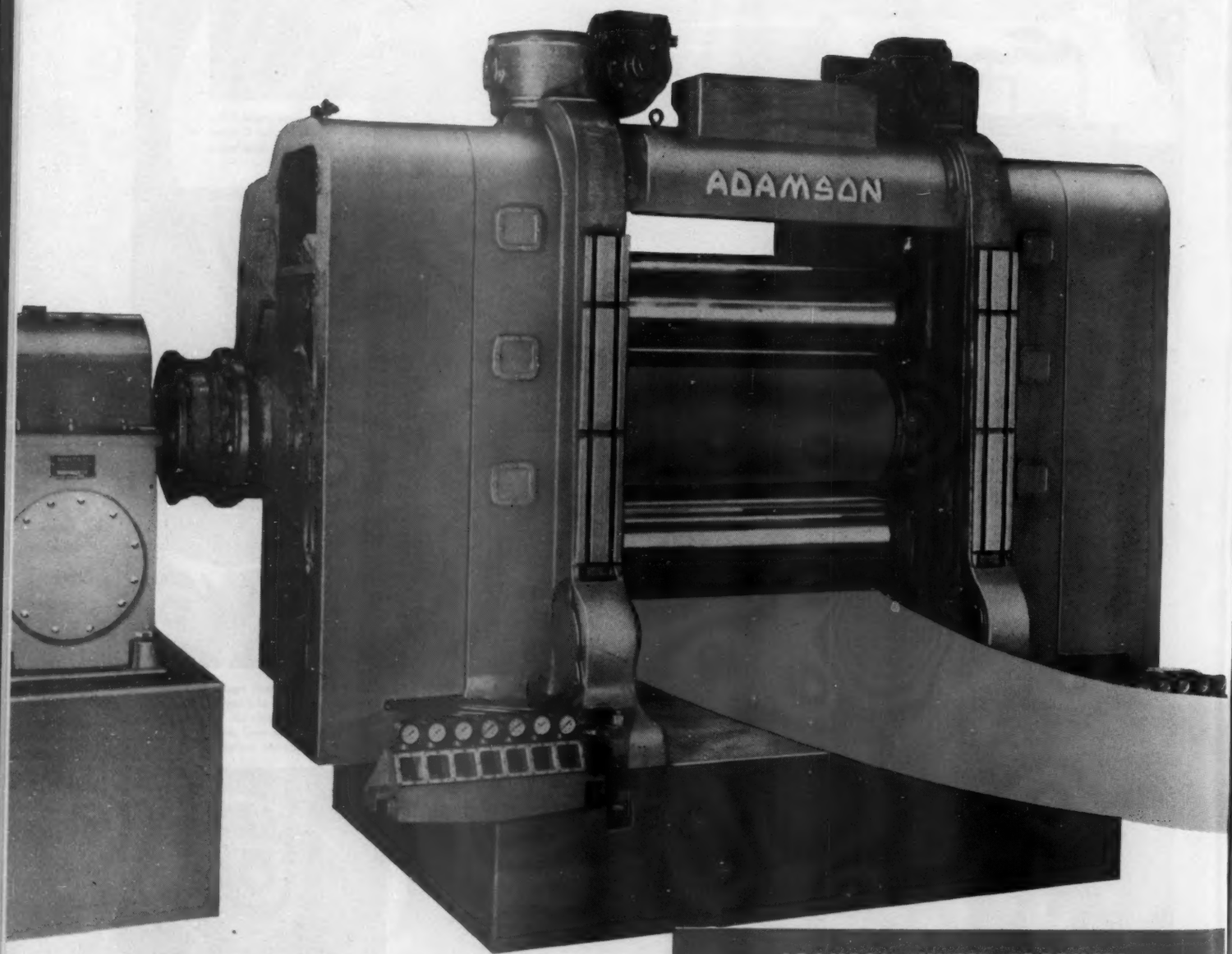


new Adamson Calenders



24" x 68" Standard 4-Roll Calender with flood lubricated roll bearings; even and friction connection gears, and Cone Worm Drive direct connected to middle roll.

ADAMSON UNITED PRODUCTS FOR THE PLASTICS INDUSTRY

- Calenders for plastic film or coated fabrics—all sizes
- Cooling Rolls for calendered film
- Wind-ups for calendered film
- Cut-offs for rigid plastic sheet
- Festoons or Storage Compensators for plastic coated fabrics
- Wind-ups for calendered fabrics
- Embossing Calenders
- Mixing Mills—all sizes up to 28" x 84"
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- Plywood Presses
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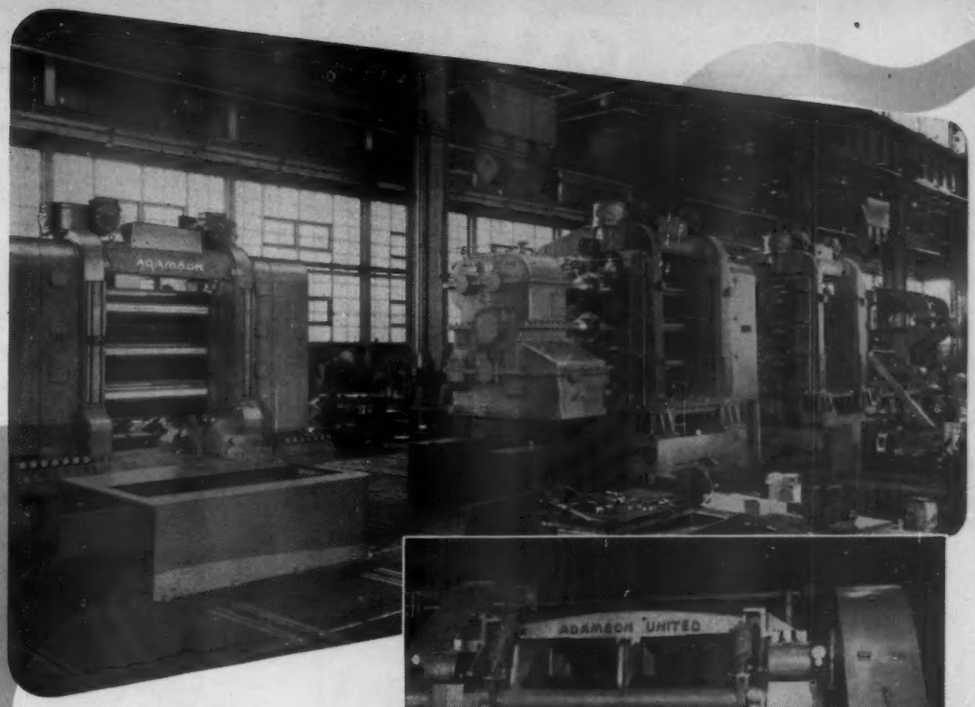


Calender Assembly Floor, New Castle Plant.
24" x 68" Std. 4-Roll Calender in foreground . . . three Precision Type 4-Roll Calenders in background.

For sheeting unsupported Plastic Film

These entirely new Calenders produce film of varying thicknesses ranging from extremely low gauges up to rigid sheets. They permit higher and more uniform roll temperatures so that wider sheets can be calendered. Uniform gauges across width of sheet are maintained with no change in roll crown.

THE NEW 24" x 68" STANDARD 4-ROLL CALENDER

This modern unit is ideally suited for the manufacture of standard types of unsupported film and for the coating of fabrics. It is capable of producing the finest quality product at high production speeds. Some outstanding features are:

- **High capacity drive direct-connected to center roll.**
- **Pre-loaded roll bearings.**
- **No-leak oil seals.**
- **Temperature control of bearing lubricant.**
- **Precision roll adjustment.**
- **Pre-loaded adjusting screws.**
- **Rugged frame; oversize bearings.**
- **Compact floor arrangement.**

ALSO A NEW PRECISION TYPE 4-ROLL CALENDER

Carefully selected and pre-loaded roller bearings support the rolls with no bearing clearances and are adjusted for high temperature operation. Hydraulic jacks positively position the bearings against the adjusting screws. Precision Cone Worm reduction units and individual motors operate each adjusting screw.

Rolls are separately driven from a gear stand through universal couplings, allowing free adjustment without disturbing the position of the gears. These operate in a separate case, and on fixed centers, so that teeth can be cut with a fine pitch.

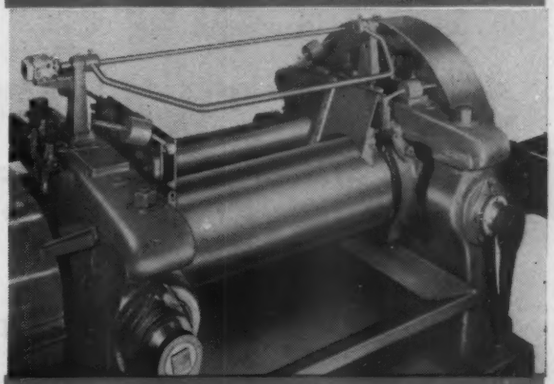
The *Roll axes are crossed* by a special cambering attachment. This compensates for roll deflections due to varying stock plasticities or Calender speeds, and avoids the necessity of re-grinding rolls to different crowns for any of these changing conditions.

The rolls, with their anti-friction bearings, can be quickly detached from the universal couplings and removed from the frames. A special roll-changing device can be provided for this purpose.

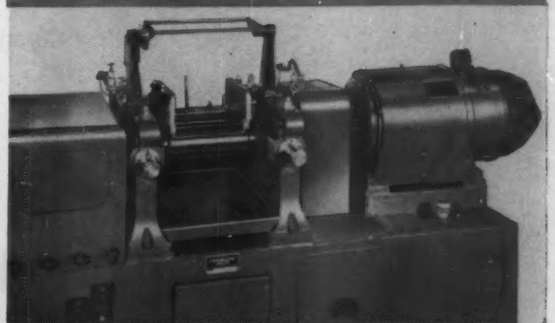
We design and supply entire calendering process systems including all accessory equipment. To assure our customers the earliest possible delivery of precision-built plastics processing equipment, we have combined the facilities of six great plants, each operated by personnel with years of experience in the building of heavy machinery. From these plants the various components of steel and iron castings, gears, chilled iron rolls and other parts are assembled at New Castle.

Complete details on the Calenders and Mills illustrated, or on any other equipment we manufacture, will be furnished on your request.

Modern 26" x 84" Mill equipped with self adjusting center guide and pneumatically operated roll scraper which can be moved against or away from roll by operation of foot treadle or hand valve.



New, Heavy-Duty 24" x 60" Standard Mill for mixing and blending raw materials prior to calendering. It is equipped with oil flood lubrication . . . triple oil seals on all bearings and tiltable, easily cleaned stock guides. Can also be furnished in 16" x 36" or 20" x 48" sizes.



Very late model 8" x 16" self-contained Lab. Mill incorporating many features wanted by research laboratories. Furnished on cabinet with all controls mounted flush on front cabinet panel. Has flood lubricated bearings . . . triple oil seals . . . tiltable stock guides. Can also supply in 6" x 13" or 12" x 24" sizes.

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You have only to let us know what your problem is. We'll be glad to send you helpful information developed in solving similar problems—or we'll send an IOI engineer to talk the matter over with you, if you prefer. No obligation in either case.

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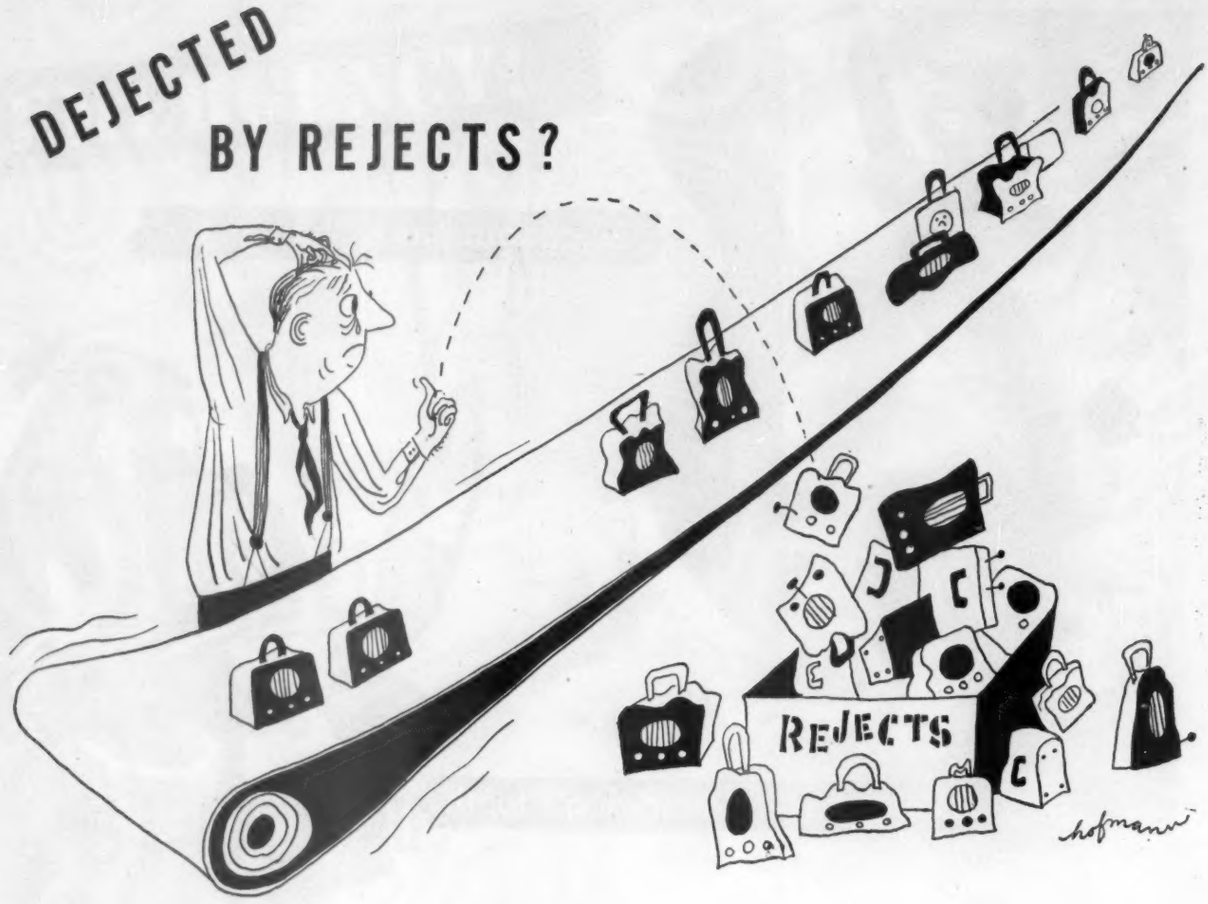

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The rebuilding will be thorough, an Interstate Standard job, which means precision workmanship with unsurpassed facilities.

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We are right in the heart of the Rubber Industry — going now on 15 years of Specialized Banbury experience.

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- Never builds up on the molds.
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Used in the manufacture of adhesives, box toes, ethyl cellulose lacquers, impregnations, linoleum, floor tile, sealing compounds, varnishes and in the compounding of natural and synthetic rubber.

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When a rubber product, such as a bathing suit, is made with TITANOX pigments, it's sure to have lasting whiteness and brightness. Not only are these qualities imparted in great measure by these versatile titanium dioxide pigments, but also maximum opacity is contributed to rubber products of all kinds.

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VOLUME 63
NUMBER 5

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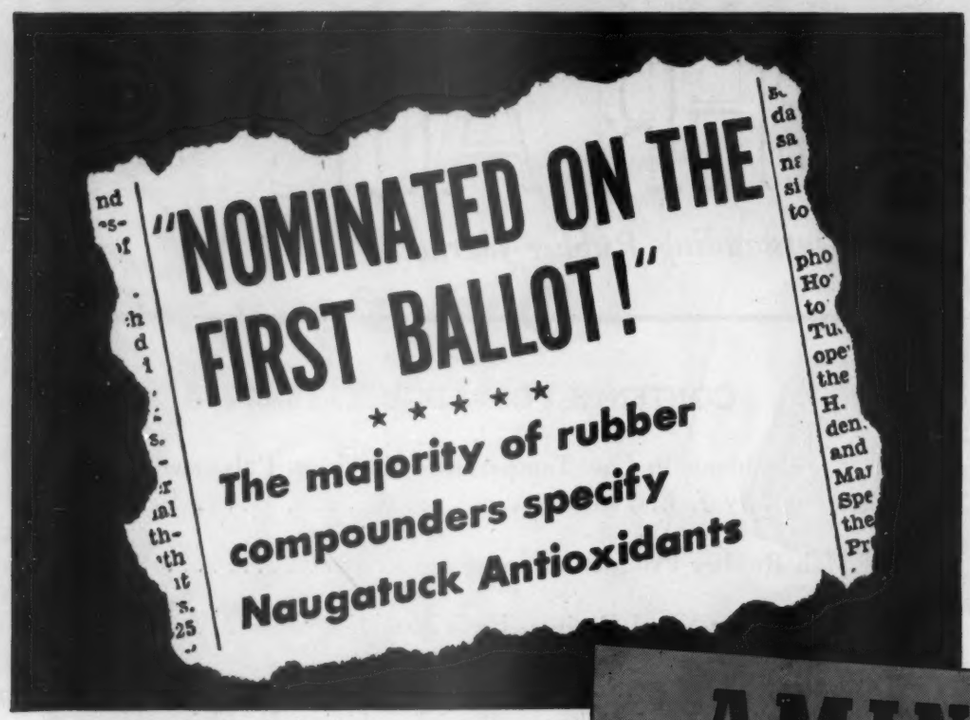

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Process Problems in Low Temperature Emulsion Polymerization

By J. E. TROYAN

Research Department, Phillips Petroleum Co., Bartlesville, Oklahoma.

When emusion polymerization of butadiene and styrene is conducted at temperatures in the range of 0° to 41°F., high elastomers possessing greatly improved properties are produced. However, low temperature operation involves several major process problems not encountered in the manufacture of standard GR-S at 122°F. These are the use of activated reaction recipes, the refrigeration of polymerization equipment, and the use of emulsion antifreezes.

Redox-type activated systems which have been developed for low temperature runs in the pilot plant result in reaction rates approaching those of normal GR-S even at 14°F. Heat transfer characteristics of typical activated recipes at 41° and 14°F. have been investigated in a 260-gallon reactor and compared to similar results for GR-S at 122°F. Variation in over-all heat transfer coefficients with conversion has been established at each temperature. Minimum U values of 43, 39 and 23 B.t.u./(hr.) (sq. ft.) (°F.) were obtained at 50 to 55 per cent conversion in polymerizations run at 122°, 41° and 14°F.

Using experimental heat transfer data, refrigeration requirements for a standard 30,000 ton/year plant operating at 41°F. and 14°F. are calculated as 450 and 599 tons, respectively.

When emulsion polymerizations are conducted at about 0° to 35°F., special "antifreezes" such as methanol must be included in the reaction recipe. Methanol is recovered from latex during the usual steam stripping of latex to remove unreacted styrene. A ternary equilibrium solubility diagram for the system styrene-methanol-water has been established to facilitate analysis of the two-phase condensate obtained during stripping.

THE Government-sponsored synthetic rubber industry was originally established as a national defense measure. Its principal task was to provide a domestic supply of general purpose elastomer which would serve as a replacement for natural rubber. The standard GR-S process which was selected for the manufacture of this polymer gave a product recognized to be somewhat deficient in certain properties *(8)*. During the last four years, there has been a concerted effort to develop improved elastomers which would equal or excel natural rubber in performance. Recently it has been shown that a greatly improved butadiene-styrene copolymer can be prepared by conducting polymerizations at temperatures considerably lower than the GR-S reaction level of 122° F. The low temperature copolymers, which are rapidly progressing from pilot plant development to full scale production, show higher tensiles at both normal and elevated temperatures, better resistance to cracking, lower heat build-up, improved processability and much improved tire treadwear, as compared to standard GR-S *(7)*. Activation of the polymerization by special recipes is required.

In view of rapidly increasing interest in these new high quality products and expanded production, it is of interest to consider some of the chemical engineering problems involved in their manufacture. Standard GR-S is made at 122° F. by polymerizing a 71/29 weight mixture of butadiene and styrene emulsified with soap in water *(1)*, whereas the low temperature polymers are made in much the same way except that the temperatures range from 0° F. to 50° F. Emulsion polymerization at low temperatures brings up several major problems, none of which is presently involved in the manufacture of GR-S. These are: (1) the use of special activated recipes, (2) the refrigeration of polymerization equipment, and (3) the use of antifreezes.

In estimating the refrigeration requirements, over-all heat transfer coefficients, reaction rates, heat of poly-

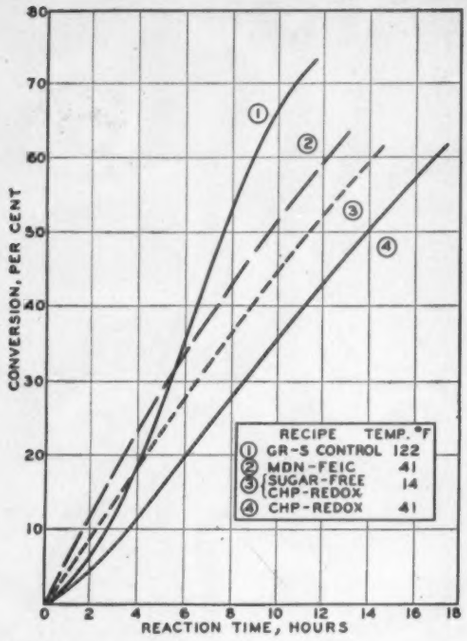

FIG. 1—Emulsion polymerization rates using activated recipes at low temperatures.

merization, and coolant compositions must be taken into consideration. Investigation of latex viscosity is also pertinent because of its influence upon heat transfer. Where polymerization temperatures approach or go below the freezing point of water, the use of an antifreeze for the aqueous emulsion is involved. Recovery of this antifreeze from latex complicates the usual GR-S latex stripping operation, but is necessary in order to make the low temperature process economically feasible.

Pilot plant investigations related to each of the above process problems have been carried out by the Phillips Petroleum Company during several years of development work. A general discussion of the low temperature emulsion polymerization process which is based on this experience is presented in this article.

Activation of Polymerization Rates at Low Temperatures

If the standard GR-S recipe were employed in the production of low temperature polymers, extremely long reaction times would be encountered. For example, although the normal time at 122° F. is about 12 hours to 77 per cent conversions *(1)*, it has been observed that approximately 25 to 65 hours would be required at 104° F. and 86° F., respectively. Polymerizations at lower temperatures would be even more impractical. Therefore, in order to manufacture low temperature polymer at reasonable production rates, a reaction time approaching that of GR-S had to be established.

To accomplish this objective, considerable research was devoted to the development of special activated recipes which gave reaction times in the desired range. In general, a 12 to 18 hour reaction to 60 to 75 per cent conversion was considered satisfactory for plant scale operations. Systems which resulted in relatively uniform rates of reaction throughout the polymerization were of particular interest from heat transfer considerations. In such reactions the maximum temperature differential required between the jacket and batch would be expected to be smaller than in runs where the rate of polymer formation (and rate of heat evolution) increases sharply during the course of the reaction.

Typical time-conversion curves for several activated recipes, which were developed and eventually used by Phillips in the pilot plant production of low temperature polymers for tire tests, are given in Figure 1. The standard GR-S curve is included for comparison. Approximate compositions of the recipes involved are summarized in Table I.

The relatively uniform reaction rates of the activated systems are apparent from the curves in Figure 1. In comparison, it is evident that GR-S polymerizes at a rather slow rate at the start, but then undergoes a marked increase in reaction rate beyond ten per cent conversion. The maximum rate seems to occur during a period of high latex viscosity (about 40 to 50 per cent conversion), where it has been observed *(4)* that heat transfer characteristics are ordinarily poorest. As a consequence, the maximum amount of cooling during GR-S runs must be provided when the jacket temperature is at a minimum. By contrast, the activated systems at 41° and 14° F. show maximum rates early in the polymerization cycle, when latex viscosity is lowest and heat transfer conditions are more favorable.

Heat Transfer Considerations

The exothermic heat of reaction during polymerization of GR-S is removed by circulating ordinary cooling water through the reactor jacket. When polymerizations are conducted at low temperatures, a special refrigerated coolant system must be installed. Before the capacity of such a refrigeration system can be calculated for a low temperature polymer production unit, several variables must be fixed. These are: (a) actual polymerization temperature, (b) available heat transfer area, (c) rate of heat evolution (average and maximum), (d) over-all heat transfer coefficient, and (e) differential between batch and jacket temperatures.

For any particular system, the reaction temperature (a) and transfer area (b) are usually constant and readily established. Heat evolved in the polymerizer (c), which must be removed by the refrigerated coolant, is composed of heat of polymerization plus heat imparted by the agitator. The latter value has been determined experimentally as the difference between power required by the agitator during reaction and the no-load power demand. Heat load due to polymerization was based in the pilot plant studies upon the rate of polymer

TABLE I—ACTIVATED RECIPES FOR LOW TEMPERATURE EMULSION POLYMERIZATIONS

	MDN-Feic Recipe [1]	CHP-Redox Recipe [2]	Sugar-Free CHP-Redox Recipe [3]	Standard GR-S
Reaction Temperature, °F.	41	41	14	122
Recipe Parts by Weight				
Water	180	180	180–250	180
Methanol	—	—	16–25% [4]	—
Butadiene	70	72	70	72
Styrene	30	28	30	28
Emulsifier	4.7	4.7	5.0	4.3
Modifier	0.2–0.4	0.1–0.3	0–0.2	0.3
Catalyst	0.3	0.15	0.2	0.2
Activator	0.4	3.8	0.7	—
Electrolyte	0.6	0.6	0–0.4	—

(1) Diazo thio ether-ferricyanide activation. (2) Iron pyrophosphate, sugar, cumene hydroperoxide system. (3) Sugar-free variation of 41° F. CHP-Redox system. (4) Per cent of total aqueous phase.

TABLE II—VARIATION OF OVER-ALL HEAT TRANSFER COEFFICIENT WITH CONVERSION IN GR-S POLYMERIZATIONS AT 122° F.

U = B.t.u./(hr.) (sq.ft.) (°F.)

Standard Plant Reactor *(4)*		260 Gallon Pilot Plant Reactor											
		R-3 (2 baffles)		R-7		R-12		R-15 (one baffle)		R-16		R-20	
% Conv.	U	% Conv.	U	% Conv.	U	% Conv.	U	% Conv.	U	% Conv.	U	% Conv.	U
10	95	12.0	103.0	3.0	60.1	8.4	60.0	7.5	52.0	8.2	68.5	8.5	48.3
20	94	18.9	88.2	7.0	55.3	15.1	65.7	13.3	62.7	17.5	69.4	14.4	67.4
30	86	25.9	74.2	11.6	60.3	23.5	60.5	19.4	54.4	29.4	65.1	20.8	62.1
40	70	33.5	67.8	17.2	67.4	30.5	59.4	26.1	56.2	42.9	45.5	27.7	55.3
50	48	41.4	54.1	23.3	61.1	39.4	46.0	34.0	50.8	—	—	35.3	48.9
60	37	48.8	45.0	29.9	58.9	48.2	42.9	41.9	46.0	—	—	43.4	53.2
70	40	55.6	41.9	36.7	48.9	56.0	40.0	49.5	43.9	—	—	51.2	51.1
—	—	62.2	47.8	43.3	44.6	62.5	41.5	56.4	48.1	—	—	64.5	50.3
—	—	68.0	48.2	49.4	42.3	68.1	42.1	62.9	57.6	—	—	69.0	42.7
—	—	72.4	45.3	54.8	47.8	—	—	—	—	—	—	—	—
—	—	—	—	60.6	51.9	—	—	—	—	—	—	—	—
—	—	—	—	65.7	58.1	—	—	—	—	—	—	—	—

formation and an estimated heat of polymerization (ΔH_p). Typical polymerization rates observed in low temperature runs have already been described in the foregoing section. The selection of an average value for ΔH_p will be discussed later in this section. In the absence of data on over-all heat transfer coefficients (d) at low temperatures, experimental values were determined by the pilot plant. This work is also summarized later in this section.

After data for the first four points outlined above have been established, the required over-all temperature differential (Δt) between coolant and batch (e) can be calculated from the general heat transfer equation:

$$q = UA\Delta t \quad (1)$$

or

$$q = Q_p + Q_a = (\Delta H_p)\ (W)/\theta + Q_a = UA\Delta t \quad (2)$$

where

q = heat transferred, B.t.u./hr.
Q_p = polymerization heat evolved, B.t.u./hr.
Q_a = heat of agitation, B.t.u./hr.
W/θ = weight of polymer produced, lbs./hr.
ΔH_p = heat of polymerization, B.t.u./lb.
U = over-all heat transfer coefficient, B.t.u./(hr.) (sq. ft.) (°F.)
A = area of cooling surface, sq. ft.
Δt = temperature differential, °F.

Then, using total heat load and indicated Δt, refrigeration needs for a specific polymerization process can be readily estimated. Examples of such calculations are presented in another section of this paper, following the discussion of pertinent heat data.

Heat of Polymerization: As previously described, the heat evolved during polymerization was calculated in pilot plant tests from the rate of polymer formation (W/θ) and the heat of polymerization (ΔH_p). Selection of an average figure for ΔH_p was difficult, since a wide range of experimental and theoretical values were available. Following an analysis of all data, which took into consideration the fact that ΔH_p varies with the combining ratio of butadiene and styrene, it was estimated that 550 B.t.u./lb. would be a reasonable average value for calculations. Even though the instantaneous heat of reaction may vary from this figure by ± 50 B.t.u./lb. during polymerization, the possible error amounts to less than ten per cent. This was eventually found to be accurate enough to show differences in the heat transfer characteristics at various temperature levels.

It should be mentioned in passing that the 550 B.t.u./lb. value was selected on the basis of a combined styrene content in the polymer of about 23 to 24 per cent by weight. Polymers prepared at 41° and 14° F. by Phillips have shown roughly 22 to 25 per cent styrene, depending upon the butadiene-styrene charge ratio used. Currently GR-S averages about 23.5 per cent styrene *(4)*.

As a check on the assumed value of ΔH_p, the heat of polymerization for a 76/24 butadiene-styrene copolymer was calculated very roughly from heats of polymerization reported for butadiene *(6)* (19.0 k. cal./mole) and styrene *(5)* (17.4 k. cal./mole). A value of 554 B.t.u./lb. was obtained, which agrees very well with the value assumed in this study.

Heat Transfer Coefficients: Over-all heat transfer coefficients for the low temperature systems were calculated from pilot plant data on polymerizations carried out in a 260-gallon, glass-lined, jacketed vessel. Mixing was provided by a three-blade impeller agitator running at 100 r.p.m. The unit was equipped with a single baffle to prevent vortex formation. Heat transfer surface amounted to 39 to 41 square feet, depending upon the volume of charge involved. Heat removed by the jacket

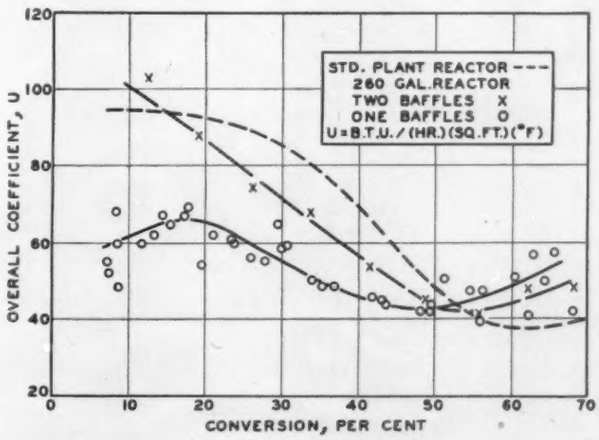

FIG. 2—Over-all heat transfer coefficients for GR-S recipe at 122° F.

TABLE III—VARIATION OF OVER-ALL HEAT TRANSFER COEFFICIENT WITH CONVERSION IN POLYMERIZATIONS CONDUCTED AT 14° F. IN 260-GALLON REACTOR

U = B.t.u./(hr.) (sq.ft.) (°F.)

MDN-Feic Recipe

Run 37		Run 36		Run 35		Run 26		Run 25		Run 27		Run 30		Run 23		Run 22		Run 21	
% Conv.	U	% Conv.	U	% Conv.	U	% Conv.	U	% Conv.	U	% Conv.	U	% Conv.	U	% Conv.	U	% Conv.	U	% Conv.	U
16.8	43.5	9.6	42.7	19.3	40.9	7.0	38.8	3.4	58.9	4.4	48.3	3.3	51.3	18.0	43.0	2.7	52.0	13.0	38.8
22.7	44.7	22.6	45.4	25.6	45.3	13.8	40.6	16.6	52.2	16.1	49.8	10.5	46.8	27.3	52.0	9.6	39.7	23.2	39.0
32.2	38.2	27.7	51.7	30.8	43.5	27.9	41.2	23.5	51.3	25.7	49.8	17.5	47.6	41.8	43.6	17.2	41.3	31.6	35.8
35.8	32.3	36.2	47.5	35.0	35.6	37.6	43.6	30.7	42.2	30.4	40.3	23.6	50.8	46.7	36.3	23.8	39.1	36.8	36.0
39.6	37.8	41.0	38.6	38.5	34.9	47.1	35.7	34.6	44.3	34.3	43.6	32.0	47.7	51.6	35.7	29.5	33.8	42.0	34.4
44.2	46.9	45.9	36.5	43.8	34.0	55.8	36.4	38.5	43.2	40.3	42.5	39.5	47.7	56.8	31.8	38.6	37.1	46.9	35.4
49.7	41.6	53.8	33.6	50.7	33.1	—	—	45.5	43.5	50.0	32.7	44.6	35.6	—	—	48.3	36.6	51.6	31.1
56.0	33.2	—	—	55.8	29.9	—	—	53.5	38.1	58.0	35.2	50.7	38.1	—	—	58.0	34.0	56.0	29.7

CHP-Redox Recipe

Run 70		Run 79		Run 62		Run 61		Run 59		Run 57		Run 52		Run 42		Run 38		Run 39	
4.9	50.8	7.3	39.5	12.7	46.3	12.9	40.8	8.0	51.3	12.1	50.8	12.4	43.0	11.8	50.2	11.8	36.5	3.9	50.0
10.6	50.8	18.6	45.5	20.3	48.1	20.3	48.5	17.9	53.6	20.3	49.3	19.5	45.7	27.9	50.8	19.4	52.1	11.4	47.0
22.9	50.0	31.3	45.3	41.0	41.2	27.3	42.5	27.0	52.0	34.6	43.1	27.3	47.1	35.5	49.2	27.7	41.8	19.2	47.4
34.9	48.3	43.0	41.3	53.0	44.9	34.0	41.0	35.5	49.6	41.3	43.7	35.2	47.9	42.5	42.8	35.7	45.3	32.4	46.3
45.2	42.4	54.1	35.3	—	—	41.0	48.4	43.5	39.4	48.1	35.5	42.8	43.6	52.3	41.0	43.7	37.8	39.5	47.5
49.2	41.7	—	—	—	—	47.8	44.0	51.3	44.4	54.2	36.8	49.2	39.4	—	—	51.2	37.7	46.8	43.6
55.7	45.2	—	—	—	—	54.5	33.2	—	—	58.2	36.7	56.3	39.8	—	—	58.7	47.6	54.3	44.4

coolant was determined from the total heat of agitation and the heat due to polymer formation, as previously discussed. In all runs the heat of agitation (Q_a), based on power readings, was assumed to be 1000 B.t.u./hr. Some slight variation from this value was noted in different recipes, and at low and high conversions in the same run, but the differences were found to represent only insignificant errors in final U values.

The average temperature differential between batch and jacket for any period of time was obtained by graphically integrating the area between the recorded batch and jacket temperature curves. Jacket temperature was taken as the average of inlet and outlet readings. Experimental results are discussed below:

(1) 122° F. STANDARD GR-S SYSTEM: In order to compare heat transfer characteristics obtained in the 260-gallon pilot plant reactor to reported *(4)* standard plant data, several GR-S control batches were made at 122° F. U values at increasing conversions in these runs were calculated using Equation (2) in the following manner:

Period in run	5 to 6 hours
Conversion rise per hour	34.9 − 26.0 = 8.9%
Average conversion for period	(34.9 + 26.0)/2 = 30.5
ΔT	12.0° F.
Heat of agitation, Q_a	1000 B.t.u./hr.
Jacket area, A	39 sq. ft.
Monomer charge	550 pounds
ΔH_p	550 B.t.u./lb.

$$q = (\Delta H_p)(W)/\theta + Q_a = UA\Delta t$$

$$U = \frac{(0.089)(550)(550) + 1000}{(39)(12.0)}$$

U = 59.7 B.t.u./(hr.) (sq.ft.) (°F.) at 30.5% conversion

Data for individual batches are summarized in Table II and plotted in Figure 2. Typical results *(4)* for a 3750-gallon plant batch are also included for comparison.

In the first 260-gallon run (R3) where two baffles were present, the pilot plant U values closely approached the standard curve. A single baffle was used in all subsequent runs at 122° F. or lower to reduce turbulence, which was observed to interfere with modification of the polymer at 122° F. As a consequence of reduced baffling, U values were considerably lower early in the run. Beyond 50 per cent conversion, the results were essentially identical for both types of baffling.

(2) 41° F. ACTIVATED SYSTEMS: The two activated recipes used at 41° F. gave slightly different heat transfer characteristics, U values being somewhat lower at all conversions for the MDN-feic system. This was attributed to higher latex viscosity, which in turn appeared to be controlled by the lower amount of water soluble activator ingredients present. In Table I, it is seen that

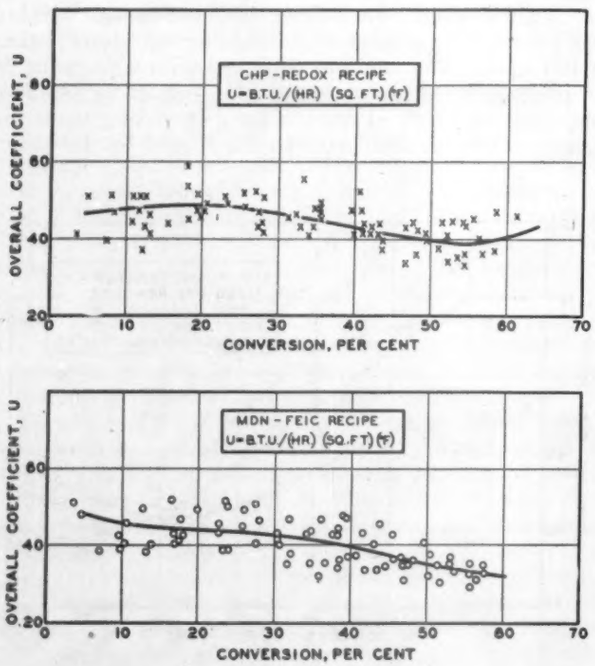

FIG. 3—Over-all heat transfer coefficients for activated recipes at 41° F. in 260-gallon reactor.

TABLE IV—VARIATION OF OVER-ALL HEAT TRANSFER COEFFICIENT WITH CONVERSION IN POLYMERIZATIONS CONDUCTED AT 14° F. IN 260-GALLON REACTOR

U = B.t.u./(hr.) (sq.ft.) (°F.)

Aqueous Phase: 200 parts 16.7% Methanol

Run 90		Run 93		Run 94		Run 95		Run 96*		Run 97*	
% Conv.	U	% Conv.	U	% Conv.	U	% Conv.	U	% Conv.	U	% Conv.	U
10.4	27.4	9.0	40.0	6.0	30.5	18.1	34.7	15.0	37.0	10.0	27.2
18.7	28.5	12.6	35.9	13.5	32.4	32.0	28.0	22.7	34.5	18.1	30.4
27.5	27.9	22.1	31.8	23.0	32.5	49.6	24.0	33.4	32.1	27.3	29.3
36.1	23.8	30.7	26.7	31.9	28.4	57.3	22.6	42.6	30.6	38.3	24.3
45.2	23.3	38.4	23.8	39.6	24.4	——	——	48.8	12.4	47.0	13.8
52.7	19.7	45.3	22.6	45.9	25.7	——	——	52.3	10.1	54.1	10.1
57.4	20.9	55.2	23.0	51.2	22.1	——	——	55.2	9.0	58.1	6.8
——	——	59.0	20.0	55.8	22.8	——	——	59.0	10.0	——	——

Aqueous Phase: 200 parts 18% Methanol

Run 99 % Conv.	7.0	14.1	24.3	34.7	44.5	52.5	56.8	——
Run 99 U	24.8	27.6	32.7	31.3	18.8	17.1	16.2	——

Aqueous Phase: 210 parts 18% Methanol

Run 100 % Conv.	4.4	14.4	24.1	32.6	43.3	51.7	55.4	57.3
Run 100 U	33.0	31.7	26.8	24.2	23.5	24.5	26.9	23.9

Aqueous Phase: 220 parts 18% Methanol

Run 102		Run 104		Run 112		Run 114		Run 117		Run 118	
% Conv.	U	% Conv.	U	% Conv.	U	% Conv.	U	% Conv.	U	% Conv.	U
9.0	22.4	2.0	37.3	8.4	39.9	7.0	30.1	5.9	32.9	6.8	25.5
12.9	34.4	7.5	29.7	17.0	39.9	11.9	34.9	15.7	35.3	13.7	31.6
19.4	36.0	15.6	35.9	27.0	30.3	16.8	33.8	25.5	32.7	23.2	29.5
26.6	33.6	24.3	36.4	35.9	26.6	29.2	30.4	34.9	31.9	32.4	30.2
37.0	28.8	32.6	30.2	44.1	24.2	37.0	27.7	43.8	25.6	40.9	27.3
46.0	23.4	40.4	26.7	51.2	23.4	47.6	23.4	52.3	20.5	49.0	22.3
53.7	22.1	——	——	56.7	27.7	53.0	25.8	——	——	55.8	25.1
58.7	19.6	——	——	——	——	58.1	32.7	——	——	——	——

* Freezing occurred.

the MDN-feic system contains considerably less activator than the CHP-redox recipe.

Average U values for 41° F. runs summarized in Table III are plotted against conversion in Figure 3. The minimum over-all heat transfer coefficient with the CHP-redox recipe is about 38 B.t.u./(hr.) (sq. ft.) (°F.), which is only slightly less than the minimum observed in the 122° F. GR-S system.

(3) 14° F. ACTIVATED SYSTEMS: At 14° F. over-all heat transfer coefficients were determined for several variations in the sugar-free CHP-redox polymerization recipe in order to establish which system gave the best results. The recipes used in the initial pilot plant work contained 180 parts of 16.7 per cent methanol. Latex was observed to be rather viscous, and freezing on the wall occurred when jacket temperature went below 0° F. The presence of a frozen latex film was reflected in U values which dropped from about 27 to 15 B.t.u./(hr.) (sq. ft.) (°F.) during the last hour of reaction. A subsequent run containing more aqueous phase (200 parts of 16.7 per cent methanol solution) to reduce the viscosity required jacket temperatures below —5° F. because of an abnormally fast reaction rate. Freezing was even more pronounced in this case, and U values dropped to ten B.t.u./(hr.) (sq. ft.) (°F.). Four more batches with the same recipe (Table IV, Runs R90, 93, 94, and 95), which averaged 17 hours to 60 per cent conversion and which were controlled with the jacket at —2° F. or higher, indicated an average minimum U value of 21 B.t.u./(hr.) (sq. ft.) (°F.) at 60 per cent conversion. The average U value vs. conversion curve based on these runs is given in Figure 4.

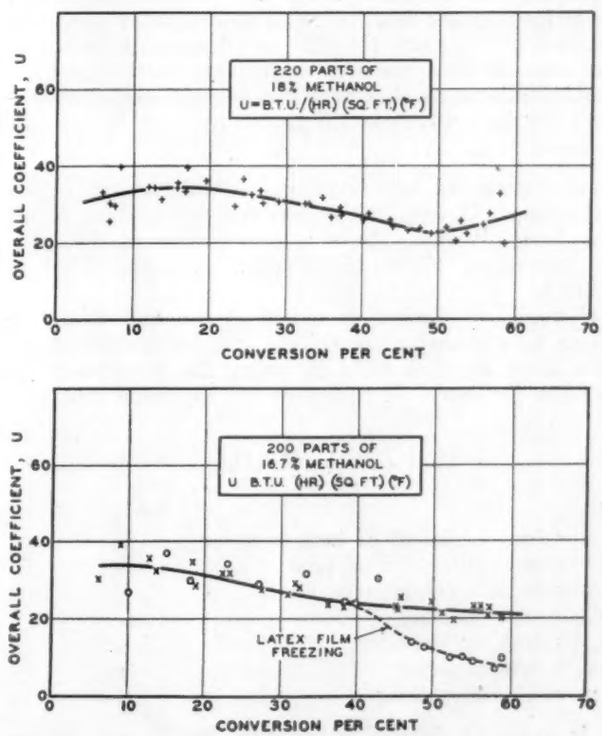

FIG. 4—Over-all heat transfer coefficients for sugar-free CHP-Redox recipe at 14° F. in 260-gallon reactor.

TABLE V—AVERAGE OVER-ALL HEAT TRANSFER COEFFICIENTS FOR LOW TEMPERATURE POLYMERIZATION SYSTEMS

U = B.t.u./(hr.) (sq. ft.) (°F.)

	Minimum	at %	U Values at % Conversion		
122° F. Controls	U	Conv.	10	40	60
Standard Plant	38	60	95	70	38
260 gal. (2 baffle).....	42	55	100	57	45
260 gal. (1 baffle).....	43	50	62	46	49
41° F. (260 gal.)					
MDN-feic	33	60	46	40	33
CHP-redox	39	54	48	43	40
14° F. (260 gal.)					
Sugar-free CHP-redox (200 parts 16.7% CH_3OH)	21	60	34	24	21
Sugar-free CHP-redox (200 parts 18% CH_3OH)	23	50	34	27	27

When rapid reactions were subsequently encountered with the recipe containing 200 parts of 16.7% methanol in two runs (R96-97), resulting jacket temperatures of —8° to —10° F. again led to freezing of latex. The average U value curve for these batches is shown in Figure 4 to drop to nine B.t.u./(hr.) (sq. ft.) (°F.). A layer of frozen latex one-half inch thick was noted in the reactor when these runs were discharged. Detailed data are listed in Table IV.

Increasing the methanol in the aqueous phase to 18 per cent in batch R99 still failed to maintain a suitable transfer coefficient in the fast 14° F. runs. Values approached 15 B.t.u./(hr.) (sq. ft.) (°F.) at the end of the run. Since freezing was not encountered in this case, it was concluded that the poor heat transfer was due to high latex viscosity. In order to reduce viscosity, the aqueous phase was increased to 210 parts (R-100), and then to 220 parts (R-102) of 18 per cent methanol. The over-all heat transfer coefficients were improved by this dilution, as shown by the average curve in Figure 4 for the system containing 220 parts of 18 per cent methanol.

(4) SUMMARY OF OVER-ALL COEFFICIENTS: The variation of U with conversion for the systems which have been discussed above is summarized in the average curves of Figure 5. Typical data are given in Table V.

Viscosity of Latex: It can be shown that fairly accurate heat transfer coefficients can be calculated for latex films on pipe walls by using the McAdams *(2)* equation for liquids in turbulent flow in round tubes:

$$\frac{hD}{k} = 0.023\ (DG/\mu_\infty)^{0.8}(C\mu_\infty/k)^n \qquad (3)$$

where

h = film coefficient of heat transfer
D = inside diameter of pipe
k = thermal conductivity
G = mass velocity
μ_∞ = limiting viscosity
C = heat capacity
n = 0.3 for cooling

It is apparent from this equation that h may be expressed as a function of both G and μ_∞ as shown below:

$$h = f\ (G/\mu_\infty)^{0.8}(\mu_\infty)^{0.3} \qquad (4)$$

$$h = f\ (G)^{0.8}(\mu_\infty)^{-0.5} \qquad (5)$$

The simplified relationship (Equation 5) given above was applied to the analysis of the heat transfer problem in the agitated polymerization reactor. Two assumptions were made: first, that the over-all heat transfer coefficient (U) is controlled primarily by the latex film; and second, that velocity of latex past the reactor wall does not vary appreciably because of constant speed agitation. This means that U should be influenced principally by changes in latex viscosity, and the higher viscosities encountered at low temperatures should therefore lead to poorer heat transfer coefficients.

On the basis of this reasoning, it was decided to obtain latex viscosity data for various recipes tested in the pilot plant at 14° F. Results were used in predicting changes in the U values. Unvented latex samples were withdrawn from the reactor into a precooled receiver held at about 0° to 10° F. Apparent viscosities were determined with a Brookfield Synchro-Lectric (rotating cylinder) viscometer. Since the rate of shear exerted by the constant speed rotating cylinder was relatively low, readings were estimated to be somewhere in the range between the limiting viscosity (μ_∞) and viscosity at zero shear, (μ_o), as discussed by Winding *(9)*.

Winding has reported that μ_o for GR-S latex at 68° F. rises from 6.5 cp. at 20 per cent conversion to 32 cp. at 80 per cent. By contrast, μ_∞ is constant at 6.5 over the same conversion range. As latex temperature drops from 104° F. to 41° F., μ_∞ increases from 5.2 to only 9.3 cp. The higher values for μ_o reflect the pseudoplastic character of unvented latex, which shows relatively high stresses for low rates of shear. Apparent viscosities measured during this program were considered to be more closely comparable to the μ_∞ data mentioned above.

Although the experimental values were only considered qualitative, they were sufficiently graphic to allow prediction of improvements in over-all heat transfer coefficients. A series of typical curves showing the effect of temperature on latex viscosity at increasing conversion is shown in Figure 6 for 14° F. run R96. Viscosity-conversion data for several different systems are plotted in Figure 7. Data are summarized in Table VI.

The remarkable effect on viscosity of omitting electrolyte from the system containing 220 parts of 18 per cent methanol in run 20-53 is clearly evident. Because

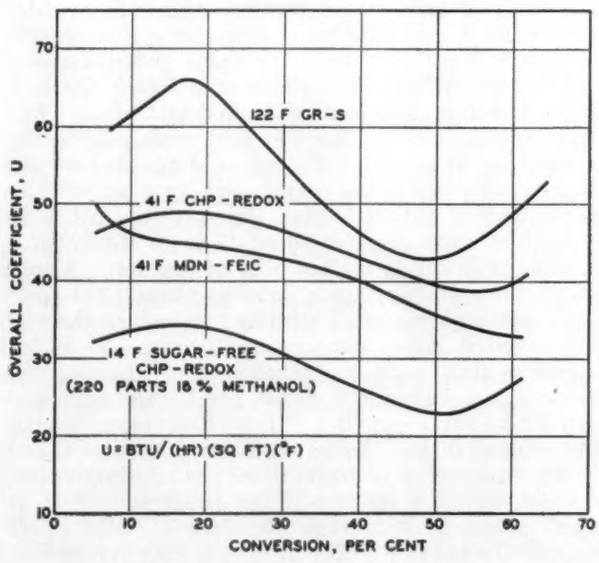

FIG. 5—Effect of temperature and recipe on over-all heat transfer coefficient in 260-gallon reactor.

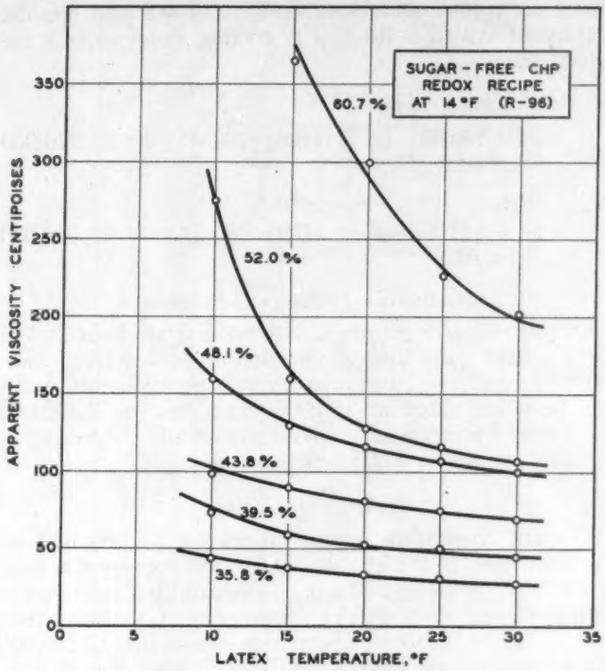

FIG. 6—Variation of apparent viscosity of unvented latex with temperature and conversion.

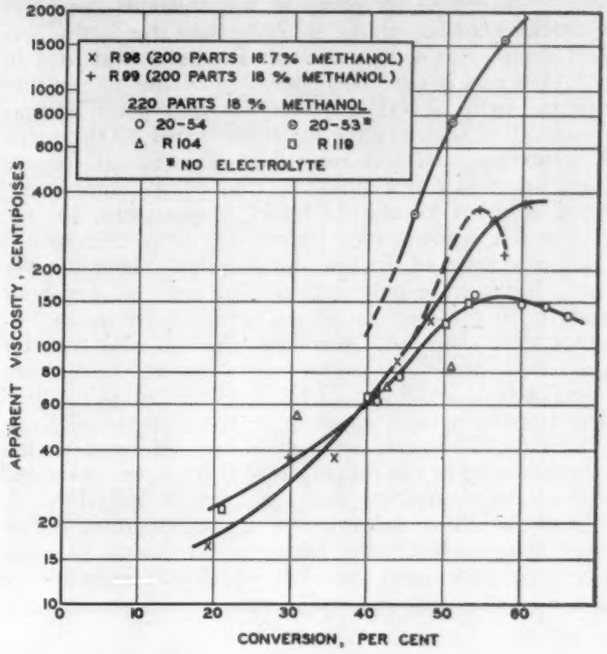

FIG. 7—Variation in apparent viscosity of unvented latex with conversion at 14° F.

of the high apparent viscosities and the expected low U values, no large scale work was conducted with this recipe. The high viscosity values for R96 and R97 (200 parts of 16.7 per cent methanol) at 50 to 60 per cent conversion (Figure 7) are reflected in the relatively low U values reported in the preceding section (Figure 4). The 260-gallon runs containing 220 parts of 18 per cent methanol which had lower viscosities (R104, R119), also had better coefficients (Figure 4). On the basis of these examples, it was concluded that the viscosity technique would be useful in evaluating the effect of such factors as the types and amounts of emulsifier, antifreeze or electrolyte on the over-all heat transfer coefficients.

Refrigeration Requirements for Low Temperature Polymerizations

Calculations for Plant Scale Operation: Using data developed in the preceding sections, calculations were

TABLE VI—APPARENT VISCOSITY OF LATEX POLYMERIZED AT 14° F.

Variation With Temperature at Increasing Conversion
Batch R96 (200 Parts of 16.7% CH_3OH)

% Conv.	10° F.	15° F.	20° F.	25° F.	30° F.
		(Viscosity in Centipoises)			
19.3	19	17	15	13	11
35.8	43	38	35	32	28
39.5	73	60	54	49	45
43.8	99	89	82	75	69
48.1	160	130	117	107	99
52.0	275	160	127	116	105
60.7	—	367	300	252	203

Run No.	Type		Variation With Conversion at 15° F.					
R96	(200 parts 16.7% CH_3OH)	% Conv.	19.3	35.8	43.8	48.1	56.0	60.7
		μ cp.	17	38	89	130	320	367
R99	(200 parts 18% CH_3OH)	% Conv.	29.8	41.9	54.4	57.9	—	—
		μ cp.	38	68	350	235	—	—
R100	(210 parts 18% CH_3OH)	% Conv.	30.1	39.6	49.1	55.4	58.3	—
		μ cp.	71	75	93	125	185	—
R104	(220 parts 18% CH_3OH)	% Conv.	30.5	42.4	50.7	—	—	—
		μ cp.	55	70	85	—	—	—
R119	(220 parts 18% CH_3OH)	% Conv.	22.3	40.0	50.4	55.8	—	—
		μ cp.	24	65	125	150	—	—
20-54	(220 parts 18% CH_3OH)	% Conv.	41.1	44.1	53.9	59.8	63.0	66.0
		μ cp.	62	77	163	150	147	133
20-53*	(220 parts 18% CH_3OH)	% Conv.	45.7	50.4	57.0	—	—	—
		μ cp.	338	770	1600	—	—	—

* No electrolyte; all other runs contain 0.4 part electrolyte.

made to determine refrigeration requirements for polymerizations conducted in the 3750-gallon standard GR-S plant reactors at 41° F. and 14° F. Total heat load in each case was based upon operation of the 24 reactors available in a 30,000 ton/year standard plant. It was assumed that each reactor batch contained 8000 pounds of monomers, and was reacted to 60 per cent conversion. Reaction times at 41° F. and 14° F. were established at about 17 and 14 hours, respectively, for the CHP-redox systems (see Figure 1). This corresponds to average rates of 3.5 and 4.3 per cent conversion per hour. Rates were only 3.3 and 3.6 per cent per hour at about 50 per cent conversion, where the minimum U values were observed. Minimum over-all heat transfer coefficients at the two reaction temperatures were taken from Table V as 38 and 23 B.t.u./(hr.) (sq. ft.) (°F.). Heat transfer area available in the reactors has been calculated as 270 square feet, while heat of agitation has been estimated *(4)* at roughly 15,000 B.t.u./hr. Assumed heat of polymerization was again set at 550 B.t.u./lb.

With the above information, the temperature differential between batch and jacket at the lowest U value was first calculated as follows from Equation 2

$$(\Delta H_p)\ (W)/\theta + Q_a = UA\Delta t$$

At 41° F.,

$$(550)\ (8000)\ (0.033) + 15{,}000 = 38\ (290)\ (\Delta t)$$

$$\Delta t = \frac{160{,}500}{11000} = 14.6° \text{ F.}$$

At 14° F.,

$$(550)\ (8000)\ (0.036) + 15{,}000 = 23\ (290)\ (\Delta t)$$

$$\Delta t = \frac{173{,}200}{6670} = 26° \text{ F.}$$

These values indicate that reactions would require minimum jacket temperatures of

41-14.6 = 26.4 at 41° F.;
and + 14-26 = —12° F. at 14° F.

Having thus established the minimum coolant temperature, the total refrigeration capacity was estimated next. The following services were considered:

(1) Maintenance of jacket temperature sufficient to control reaction (removal of reactor heat load).
(2) Cooling of reactants to reaction temperature.
(3) Compensating for heat gain through insulation and mechanical action of coolant pumps, etc.

If reactions are 17 hours at 41° F., and one hour is allowed for charging and discharging, the total time cycle per reactor is 18 hours. At 14° F., the cycle would be 15 hours. In a 24 reactor plant, maximum daily heat load would be calculated as follows:

Reactor Heat Load

At 41° F.: $\frac{24}{18} \times 24 = 32$-17 hr. batches/day

$Q = 32\ [(8000)\ (0.035)\ (550) + 15000]\ 17$
$= 91{,}800{,}000$ B.t.u./day

At 14° F.: $\frac{24}{15} \times 24 = 38.4$-14 hr. batches/day

$Q = 38.4\ [(8000)\ (0.043)\ (550) + 15000]\ 14$
$= 109{,}550{,}000$ B.t.u./day

Sensible Heat of Charge

Each reactor charge of roughly 3100 gallons must be reduced from about 80° F. to the reaction temperature. Using an approximate specific heat of 0.8 and specific gravity of 0.9 (7.5 lbs./gal.), cooling requirements involved are:

At 41° F.:

32.0 (3100) (7.5) (0.8) (80-41) = 23,220,000 B.t.u./day

At 14° F.:

38.4 (3100) (7.5) (0.8) (80-14) = 47,100,000 B.t.u./day

Heat Gain Through Insulation

During 41° F. operation, with coolant at about 20° to 25° F., heat gain through insulation of reactors, coolant tanks and lines, and primary refrigeration equipment has been estimated at 100,000 B.t.u./hr., or 2,400,000 B.t.u./day for ambient temperatures of 80° F. At 14° F. the gain would be 3,695,000 B.t.u./day.

Heat of Pumping

Coolant circulation pumps on reactor jackets and on the main feed to the evaporators would represent a total power load of about 200 h.p. Assuming that total power rating represents energy converted to heat, then 200 × 24 × 2546 equals a heat output of 12,250,000 B.t.u./day, where 2546 B.t.u. is equivalent to one h.p.-hr. This estimated value was arbitrarily used for final refrigeration calculations at both 41° and 14° F.

TOTAL HEAT LOAD SUMMARY

	At 41°F.	At 14°F.
Reactor heat load	91,800,000	109,500,000
Sensible heat of charge	23,220,000	47,100,000
Insulation heat gain	2,400,000	3,695,000
Heat of pumping	12,250,000	12,250,000
	129,670,000	172,545,000

Total refrigeration load based on the above values is equivalent to 450 tons at 41° F. and 599 tons at 14° F., where 288,000 B.t.u./day equals one ton of refrigeration. In the design of a refrigeration system these ratings would have to be specified at the minimum coolant temperatures previously determined at 41° and 14° F.; that is, at roughly 25° F. and —15° F., respectively.

The cooling loads calculated above could be reduced somewhat if heat exchange were provided between charge ingredients and discharged latex. Such an operation would be most feasible in a plant where polymerization is carried out continuously. Even then, it is anticipated that the maintenance of a satisfactory coefficient on the latex film side might pose a major problem. Fouling by precoagulum formation could reduce over-all heat transfer coefficients to a point where precooling would be inadequate at the normal rates of flow through the exchanger.

Phillips Pilot Plant Refrigeration Installation: When the Phillips Petroleum Company rubber pilot plant was designed in 1942, a 20-ton mechanical refrigeration unit was specified to control polymerizations in a 260-gallon reactor at temperatures ranging from 0 to 150° F. The unit is described briefly at this point.

Propane is used as the primary refrigerant in the system, and 40 per cent aqueous methanol serves as the coolant which is circulated through the reactor jacket. Methanol is cooled by heat exchange with propane being evaporated at constant pressure. Coolant temperatures out of the evaporator are regulated by automatic control of the propane pressure in the evaporator. Propane level in the unit is also maintained automatically by a liquid level controller. Propane vapor from the evaporator is

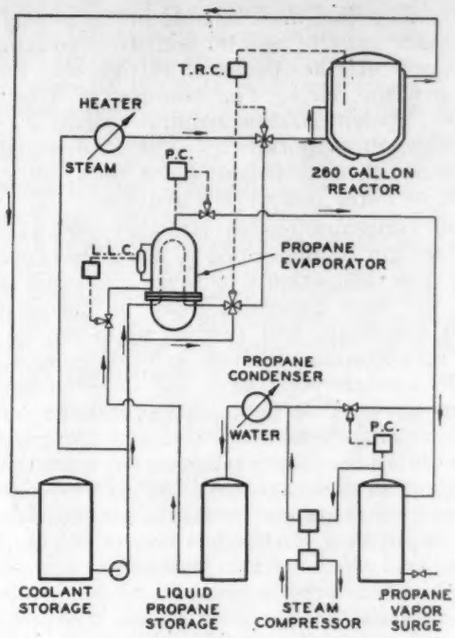

FIG. 8—Refrigeration system for 260-gallon pilot plant reactor.

compressed to 100 to 150 psig with a steam-driven Ingersoll-Rand engine. The vapor is then condensed at 90° to 100° F., liquid being accumulated in a 200-gallon storage tank.

The temperature of the coolant entering the reactor jacket is automatically controlled by blending proper volumes of refrigerated methanol from the propane evaporator and warm methanol from a steam-heated exchanger with the main recirculation stream. Methanol is stored in a 300-gallon surge tank, and is circulated to the reactor system by a Goulds centrifugal pump. The flow diagram for the system is shown in Figure 8.

Antifreeze Requirements in the Emulsion

During the development of low temperature polymers, batches were made at progressively lower temperatures as new activated polymerization recipes were perfected to give faster reaction rates. Eventually a point was reached where the problem of freezing latex had to be considered. Observations made in the 260-gallon pilot plant reactor indicated that 41° F. polymerizations could be controlled with the coolant at 25° F. with no indication of freezing at the reactor wall. Even minimum reactor jacket temperatures as low as 20° F. could be tolerated for periods of 0.5 to 1.5 hours. However, these minimum values were only encountered at low conversions, where the latex film viscosity was relatively low. At higher conversions where latex becomes more viscous, it is anticipated that freezing might eventually occur if the jacket were held much below 20° F. It is assumed that the electrolytes and other water soluble compounds contained in the special activated recipes (Table I) are responsible for the depression in the normal freezing point of water which has been observed in these systems.

Pronounced freezing was actually noted in one abnormally fast 41° F. batch which required coolant below 15° F. for two hours early in the run. The layer of frozen latex which deposited on the reactor wall was about ¾ inch thick. Its presence was reflected in very poor heat transfer coefficients.

TABLE VII—EFFECT OF VARIOUS ANTIFREEZES ON POLYMERIZATION RATE

(Sugar-Free CHP-Redox Recipe, 140 Water/40 Antifreeze)

Type Antifreeze	Boiling Pt., °C.	% Conversion at 59° F. After 4 hrs.	8 hrs.	24 hrs.
Control, 180 H_2O.	—	35.1	64.5	92.7
Methanol	64.7	21.9	43.4	85.8
Dioxane	101.4	0.2	1.5	54.9
Methyl Cellosolve.	124.3	22.8	42.6	82.0
Ethylene glycol...	197.2	41.3	74.0	—
Diethylene glycol..	245.0	37.3	65.0	—
Glycerol	290.0	42.7	79.0	—

(MDN-Feic Recipe, 200 Water/50 Antifreeze)

Type Antifreeze	Boiling Pt., °C.	% Conversion at 41° F. After 4 hrs.	7.5 hrs.	24 hrs.
Control, 250 H_2O.	—	56.4	69.9	72.5
Acetone	56.1	3.9	—	24.5
Methanol	64.7	17.3	31.1	61.6
Ethanol	78.3	0.1	—	3.5
Dioxane	101.4	13.4	29.5	59.6
Ethylene glycol...	197.2	59.4	75.1	83.9
Glycerol *	290.0	52.4	65.5	—

* 175 H_2O/75 glycerol.

On the basis of the observations outlined above, it was concluded that jacket temperatures of 20° to 25° F. could be safely tolerated in the activated polymerization systems containing no special antifreeze. This temperature limits the maximum temperature differential between jacket and batch to 16° to 21°F.

When emulsion polymerizations were conducted at temperatures in the range of 0° to 35° F., a special antifreeze compound had to be added to the reaction recipe to prevent freezing. Laboratory investigation of numerous materials to serve as emulsion antifreezes showed that ethylene glycol, glycerol, methanol, dioxane, methyl Cellosolve and diethylene glycol met one of the principal qualifications; that is, they did not seriously retard the polymerization when present in the aqueous phase to the extent of 20 to 25 per cent. Ethanol and acetone were pronounced inhibitors. Typical reaction data showing the effect of antifreeze in two different activated recipes are given in Table VII.

Although glycol and glycerol actually accelerated the polymerizations, they were not considered practical antifreezes on account of their high boiling points. Recovery of these compounds from the latex by distillation, stripping or extraction if at all possible, would constitute a major problem. Methanol, on the other hand, had one of the lowest boiling points of the materials evaluated and preliminary tests demonstrated that it could be re-

TABLE VIII—PROPERTIES OF AQUEOUS SOLUTIONS OF SEVERAL ANTIFREEZES *(3)*

Weight Per Cent	Ethylene Glycol F.P. °F.	Ethylene Glycol Flow Point °F.	Methanol F.P. °F.	Methanol Flow Point °F.	Glycerol F.P. °F.	Glycerol Flow Point °F.
15	—	—	13.1	+ 7.0	—	—
20	18.0	16.6	+ 2.8	— 1.1	22.5	15.8
25	—	—	— 6.2	—11.2	—	—
30	7.7	+ 6.8	—18.4	—19.2	16.3	+ 3.5
35	+ 1.2	— 2.4	—31.4	—40.0	7.5	— 2.0
40	— 7.8	—12.1	—43.6	—57.1	1.0	— 3.1
45	—16.0	—30.1	—	—	+ 0.4	— 4.9
50	—31.7	—47.4	—	—	— 6.5	—18.4
55	—43.0	—52.6	—	—	—17.5	—32.6
60	—50.8	—63.4	—	—	—29.2	—43.6

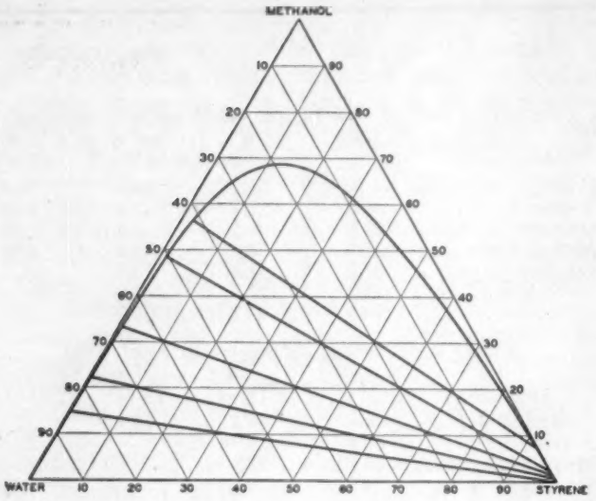

FIG. 9—Ternary equilibrium diagram for system styrene-methanol-water at 15° C.

covered readily by steam stripping or distilling from the latex. For this reason, and despite the fact that it was a slight retarder, methanol was selected as the standard antifreeze. Methanol was also desirable from a cost standpoint, since it is cheaper than glycols and much less is required to give equivalent depression of freezing. The latter point is apparent from the data given in Table VIII. Another advantage was that latices containing methanol were much less viscous.

In preliminary investigations at 14° F., the water phase in polymerizations was first adjusted to 16.7 per cent methanol (150 H_2O/30 methanol). By interpolating from data in Table VIII, a freezing point of roughly 9° F. (flow point 5° F.) is indicated for this mixture. However, electrolytes in the recipe depress the freezing point further, apparently to the same extent previously observed in the 41° F. system. Latex based on the 150/30 recipe did not freeze upon the 260-gallon reactor walls until coolant temperatures of about 0° F. were experienced.

Inspection of latex taken from one of these 14° F. reactions showed that it was slushy at 0° F., and a paste at —5° F. Since the latex was extremely viscous, the total aqueous phase was increased from 180 to 200 recipe parts. Latex in runs at this level did not freeze even when jacket temperature dropped to —2° F. However, freezing was observed in several rapid runs which called for coolant at —8° to —10° F., so the alcohol content was raised to 18.0 per cent. Simultaneously, the total water phase was increased to 220 parts in order to reduce latex viscosity even further. The resulting recipe, which was eventually used in the preparation of substantial quantities of 14° F. polymer, gave no freezing with coolant temperatures at —10° F.

Antifreeze in the Coolant

In running standard GR-S polymerizations at 122° F., the heat of reaction is removed through the reactor jacket with ordinary cooling tower water at 70° to 110° F., depending upon heat evolution rates and existing heat transfer coefficients. When low temperature polymerizations are involved, water alone is an unsatisfactory coolant since subfreezing temperatures are ordinarily required. As in most refrigeration processes, a non-freezing fluid must be used in the cooling system. This coolant must be able to withstand freezing at the temperature of the primary refrigerant (ammonia, Freon, propane, etc.). For example, if it is assumed that a 0° F. polymerization requires coolant at —20° F., and refrigerant evaporates at —30° F. to maintain this temperature, then a coolant which does not freeze at —30° F. or lower is obviously required.

Proper concentrations in water of various standard antifreezes can be prescribed to meet the conditions of such a low temperature process. Calcium chloride, though the least expensive, may be corrosive under aerating conditions, and further might not be suitable for 0° F. operation. Sodium chloride cannot be used below its eutectic point of —6.0° F. Methanol, which has been employed in pilot plant operations for several years, is essentially non-corrosive, but more costly than calcium chloride. Glycols are even more expensive, higher concentrations are needed to give a desired freeze point, and solutions are more viscous, requiring extra power for pumping. In this last respect, calcium chloride and methanol solutions are practically equivalent. Isopropanol can not be considered at temperatures approaching —30° F., since like glycols it requires higher concentrations and is considerably more viscous than methanol. It is fairly suitable at higher temperatures, however.

Methanol Antifreeze Recovery

When methanol is used as the antifreeze in low temperature emulsion polymerizations, there must be a provision in the process for recovering it from the latex, and recycling it in subsequent batches. These steps are obviously necessary if antifreeze costs are to be held to a minimum. Preliminary pilot plant studies have indicated that essentially all methanol can be removed from latex during the same operations required to effect recovery of unreacted butadiene and styrene. A small

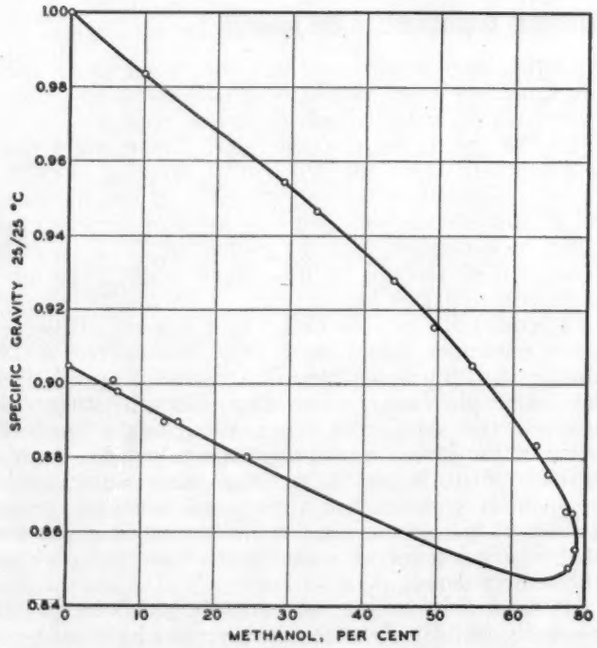

FIG. 10—Specific gravity 25/25° C. vs. methanol content of equilibrium mixtures of styrene-methanol-water prepared at 15° C.

amount of methanol is carried over during the venting of butadiene, while the major portion is taken over with the styrene during the steam stripping step.

Latex made in the pilot plant was stripped in a 12-inch diameter, perforated plate Pyrex column maintained at 100 mm Hg absolute pressure. This corresponded to a top temperature of 125° to 130° F. Pressure drop through the 10 plate column amounted to about 75 mm Hg. Latex was charged at a rate of 1.0 to 1.7 gpm and steam was adjusted to give steam to unreacted styrene weight ratios of 4 to 1 to 8 to 1. A ratio of about 4 to 1 is generally employed in large scale operations where no methanol is present. Greater amounts of steam appeared necessary in stripping low temperature latex to recover the methanol antifreeze.

Ternary System Methanol-Water-Styrene: Condensate from the stripping operation separates into two phases: an upper styrene layer saturated with methanol and water, and a lower aqueous methanol layer saturated with styrene. In conjunction with the problem of analyzing this condensate, the solubility diagram for the system styrene - methanol - water was determined. Mixtures of freshly distilled styrene and cp. methanol covering a large range of concentrations were titrated with distilled water to the first appearance of turbidity, which indicated the presence of a second phase. Samples were maintained in a constant temperature bath during titration. The equilibrium ternary compositions obtained in this manner define a solubility curve which divides the regions of one and two homogeneous liquid phases. Equilibrium data were established at both 15° and 25° C. Only a relatively small difference was noted between the two solubility curves. The curve obtained at 15° C. is reproduced in Figure 9. Tie lines included in this diagram were obtained by allowing several heterogeneous ternary mixtures of known compositions to separate into conjugate layers and determining compositions of both phases.

Specific gravities of the conjugate ternary solutions originally used in defining the solubility curve at 15° C. were measured at 25° C. to permit a correlation between specific gravity and methanol content of the equilibrium solutions. The specific gravity curve is shown in Figure 10. It was used for analysis in the following manner: Styrene and aqueous methanol phases obtained during stripping were allowed to reach equilibrium at about 15° C. and were then separated. Specific gravities of both phases were measured at 25° C. and methanol contents were read from Figure 10. Locating these values on the proper portion of the equilibrium curve in Figure 9 gave the ternary composition of both phases. Tie lines between these ternary points fell into the existing family of lines previously established if the sample phases were in equilibrium. It was estimated that results obtained by this approximate method of analysis were only accurate to 0.5 to 1.0 per cent of methanol in either phase. Styrene determinations by bromine titration were used to check data obtained by the gravity-composition correlation.

Stripping Results: Average composition of methanol and styrene layers from a typical continuous stripping operation in the pilot plant were as follows:

Compound	Aqueous Phase	Styrene Phase	Latex	
			Feed	Stripped
	Weight %		Weight %	
Styrene	0.5	98.7	3.3	0.3
Methanol	37.0	1.2	13.0	0.2
Water	62.5	0.1	—	—

Depending upon steam rates, methanol content of the aqueous phase will vary from 30 to 45 per cent. Since this is substantially greater than the 18 to 25 per cent which may be used in the emulsion, it is apparent that the recovered methanol can be recycled to the process without further concentration. The small amount of styrene present in methanol and methanol in recovered styrene can be compensated for in charging.

ACKNOWLEDGMENT

The author wishes to express his appreciation to members of the pilot plant staff and the Research Department who assisted in collecting the experimental data.

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Bolivian Rubber Production and Sales in 1947

ACCORDING to *Foreign Commerce Weekly,* publication of the Department of Commerce, the Bolivian rubber industry reached a crisis in 1947. Rubber production was estimated at 1,500 to 2,000 tons, as compared with approximately 5,000 tons in 1946. The contract between the Bolivian Government and the Rubber Development Corporation (United States Government owned), expired at the end of 1946, leaving Bolivia virtually without a market. During the war the United States took practically all the rubber Bolivia could produce.

The chief problem lies in Bolivia's high production costs, which are out of relation to the lowered price for rubber on the international market. In April, 1947, the Government authorized the Banco Agricola to buy 2,000 metric tons, at a price favorable to Bolivian producers, the period of purchase to extend to December 21, 1948. It was planned to sell the rubber to Argentina under the terms of the Bolivian-Argentine Commercial Agreement.

It became doubtful, however, that Argentina would offer a price sufficiently high to keep Bolivia from taking a substantial loss. Normally, about 200 tons are made available to Argentina each year. The Bank had bought 1,000 tons or more by the end of 1947, using funds made available by the Government.

A clearing agreement with Spain, signed February 25, 1948, providing for the purchase by that country of 3,000 tons of crude rubber over a period of 3 years, is expected to relieve the pressure to some extent. Peru also has expressed interest in purchasing 1,000 or more tons of Bolivian rubber.

Plasticizers for Vinyl Resins

By WALTER E. SCHEER

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AN ACUTE shortage of primary chemical type plasticizers is one of the major pressing problems confronting the rapidly expanding vinyl plastics industry today. Production of vinyl resins is growing at a far faster rate than the chemical industry's capacity for making suitable plasticizers, with the result that in many instances sales of vinyl resins are actually being hindered because of the lack of availability of proper plasticizers needed for their compounding. This situation will probably continue to exist for some time to come, although a considerable amount of research work is being carried out to develop new plasticizers and every effort is being made to expand production of existing products.

This article will attempt to summarize the types and amounts of vinyl resin plasticizers now available and outline some of the newer technical developments which are shortly expected to be commercialized.

The vinyl family of resins consists of several different types of materials, including polyvinyl chloride, acetate, alcohol, butyral, formal, polyvinylidene chloride, polyvinyl alkyl ethers and various copolymers consisting mainly of vinyl chloride with small amounts of modifying agents. The plasticizer shortage occurs mainly with polyvinyl chloride and copolymers of this material, which represent by far the largest volume of all vinyl resins produced. It has been estimated that by the end of this year production capacity for polyvinyl chloride and its copolymers will be on the order of 300 million pounds annually in this country, although present sales are somewhat less than this figure.

For purposes of calculation it can be said that approximately 0.4 pounds of plasticizer are needed for each pound of resin, so that if all of this production capacity of resin could be sold a demand for around 120 million pounds annually of plasticizer would exist. While it is difficult to give accurate figures on total plasticizer production since all of these are not reported, it is probable that present total output of suitable primary plasticizers is between 55 and 60 million pounds annually, or at the most only half of the required amount.

Plasticizers Now Available

For purposes of illustration the chemical type primary vinyl resin plasticizers may be divided into four major groups, considered separately later. These are as follows:

1. Phthalate esters.
2. Phosphate esters.
3. Polyglycol esters.
4. Sebacic acid type esters, including adipates and azelates.

In addition there is a relatively small production of various miscellaneous types, including amides, nitriles and fatty derivatives but the total of all of these is small compared to the four major types above. There is also a fairly large and growing production of polymeric plasticizers, such as special nitrile type synthetic rubbers and polymers based on sebacic and adipic acids, but these are not included here since only chemical plasticizers are bing considered.

Phthalate Esters: The lower phthalate esters, such as dimethyl, diethyl, dibutyl and diamyl phthalates, are rarely used with the vinyl resins because they are too volatile and are not considered permanent. Dioctyl phthalate made from 2-ethyl hexanol is the most widely used vinyl resin plasticizer. Two other octyl esters of phthalic anhydride are also made in fair quantity but in much smaller volume than the ethylhexyl ester. These are di-n-octyl phthalate made from normal octyl alcohol derived from cocoanut oil, and dicapryl phthalate made from capryl alcohol (octanol-2) produced from castor oil along with sebacic acid. Several miscellaneous phthalic esters are also made for use with the vinyl resins but in smaller volume. These include dibutoxyethyl phthalate, dicyclohexyl phthalate, and various mixed esters, such as butyl benzyl phthalate.

The total production of all these various phthalates is now about 34 million pounds annually, about 30 million of which is probably diethylhexyl phthalate. Production capacity for these phthalate plasticizers is probably considerably larger but is not all utilized because of the shortage of phthalic anhydride and the various higher alcohols required. This situation may be alleviated soon when phthalic anhydride production is increased due to more available supplies of naphthalene and when the petroleum companies begin production of iso-octyl alcohol and nonyl alcohol from olefins using the Oxo process. The phthalate esters of these two alcohols show considerable promise as vinyl resin plasticizers.

Phosphate Esters: Tricresyl phosphate is by far the most important member of this group and next to dioctyl phthalate is the most widely used vinyl plasticizer. It is preferred by the cable coating industry and in applications where fire resistance is important. Production has been severely curtailed due to the shortage of cresylic acid and this situation does not seem to be improving. Some triphenyl phosphate and mixed alkyl aryl phosphates are also employed with vinyl resins as well as a fair amout of trioctyl phosphate from 2-ethyl hexanol. Total production of all phosphate plasticizers used with vinyl resins is probably around 15 million pounds anually.

Polyglycol Esters: These products are made from triethylene and tetraethylene glycols by esterifying them with six and eight carbon synthetic fatty acids, with mixed capric and caprylic acids from cocoanut oil, and with pelargonic acid made along with azelaic acid from red oil. They are beginning to assume a very important place in the vinyl resin picture and although figures as to production are not available they probably represent a total production of about 7 million pounds per year.

Sebacic Acid Type Esters: Included in this group are esters of adipic and azelaic acids as well as any other

TABLE I — EVALUATION OF VINYL RESIN PLASTICIZERS

	Ultimate Tensile (psi)	Elongation (%)	Modulus at 100% Elongation (psi)	Shore Hardness	Brittleness Temperature	Wt. Loss After 24 Hrs. @ 250°F. (%)	Thermal Stability
Dioctyl Phthalate	2865	325	1100	74	—40°F.	2.60	Good
Tricresyl Phosphate	3125	260	1725	91	—20°F.	0.60	Poor
Dioctyl Sebacate	2205	325	890	81	Below —70°F.	0.65	Good
Dibutyl Oxydibutyrate	2315	387	550	63	Below —70°F.	24.40	Fair
Dihexyl Oxydibutyrate	2315	350	635	66	Below —70°F.	5.90	Fair
Dioctyl Oxydibutyrate	1975	270	785	70	Below —70°F.	2.58	Fair
Dibutyl Thiodibutyrate	2240	355	620	62	Below —70°F.	8.48	Fair
Dihexyl Thiodibutyrate	2300	355	625	64	Below —70°F.	2.09	Good
Dioctyl Thiodibutyrate	1825	350	545	63	Below —70°F.	2.00	Good
Dibutoxyethyl Dithiodiglycolate	2445	275	800	75	Below —70°F.	1.70	Excellent
Dioctyl Dithiodiglycolate	3100	325	1100	89	Below —70°F.	1.95	Excellent
Tributyl Carboxymethyl Mercaptosuccinate	2540	355	540	68	Below —70°F.	6.80	Good
Dipropyl Tetrachlorophthalate	3190	270	2180	97	—10°F.	6.40	Good
Dibutyl Tetrochlorophthalate	3170	275	1820	96	—30°F.	3.70	Good

dicarboxylic acids containing two terminal carboxyl groups separated by a relatively long alkyl group. Total production of these products is probably around 3 million pounds annually, mostly sebacic acid esters.

The sebacates, particularly dioctyl and dibenzyl sebacate, are very desirable plasticizers from the performance standpoint but their use is limited because of their relatively high cost. This situation will not improve until castor oil becomes much lower in price, since sebacic acid is made along with capryl alcohol from this vegetable oil.

The azelates are very similar to the sebacates but production of azelaic acid is small and the material is also quite high priced. The adipates are not widely used because even the esters with higher alcohol are considered to be too volatile. However, dibutoxyethyl adipate is now used with polyvinyl butyral in automobile safety glass where volatility is not as important as in the case of unsupported film for other uses.

Some New Plasticizers

Naturally, much development work is going on in various laboratories directed chiefly to developing new vinyl resin plasticizers of better performance characteristics, lower cost, or derived from more readily available raw materials as compared to the products which are now available. A number of these newly developed plasticizers have been evaluated as plasticizers for Vinylite VYNW and compared with tricresyl phosphate, dioctyl phthalate and dioctyl sebacate as standards.

The formulation used in all tests reported here consisted of 100 parts of resin, 55 parts of plasticizer and 2 parts of calcium stearate, milled for 10 minutes on a two roll laboratory mill at 275-280°F. and then molded at 300°F. for 5 minutes at 1500 psi. Calcium stearate, although generally not considered a satisfactory stabilizer, was used in order to show more readily any inherent thermal instability present in the compounds evaluated.

Standard A.S.T.M. methods were used in determining the physical properties of the molded slabs. Volatility was measured by heating the molded slab for 24 hours at 250°F. in an oven with good circulation under standard conditions and measuring the weight loss. Thermal stability was determined by visual examination of the heated slabs.

It should be emphasized that while these tests give some preliminary indication of the value of a material as a vinyl resin plasticizer they can by no means be considered as a complete evaluation. In order for this to be done, weatherometer tests must be run, oil and water extraction figures determined, the effect of stabilizers studied and complete data obtained on the performance of the proposed plasticizer under actual conditions encountered in use of the finished plastic article. It should also be remembered that in commercial practice it is customary to use blends of different plasticizers in order to obtain the benefit of the best properties of each and that therefore it is necessary to study the proposed new plasticizer in combination with other plasticizing agents.

The results of the tests on the new plasticizers in comparison with tricresyl phosphate, dioctyl phthlate and dioctyl sebacate are given in Table I. It will be noted that these new products fall into five different groups, each of which will be considered separately below. These groups are as follows:

1. Oxydibutyric Acid Esters.
2. Thiodibutyric Acid Esters.
3. Dithiodiglycolic Acid Esters.
4. Carboxymethyl Mercaptosuccinic Acid Esters.
5. Tetrachlorophthalic Anhydride Esters.

These five groups are chemically very different from other plasticizers now used commercially and therefore it is interesting to compare their performance as vinyl resin plasticizers.

Oxydibutyric Acid Esters: This acid was developed in Germany as a replacement for sebacic acid, since castor oil was not available there for the production of sebacates. Acetylene and formaldehyde are reacted to form first 1,4-butynediol and then successively 1,4-butanediol, butyrolactone and finally oxydibutyric acid. The chemical

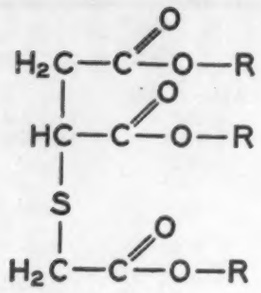

Fig. 1

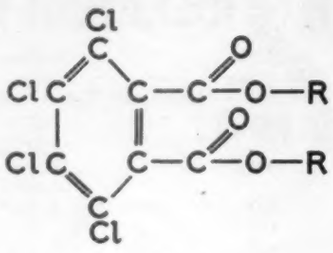

Fig. 2

(1) Oxydibutyric acid esters. (2) Thiodibutyric acid esters.

structure of esters of this acid is shown in Figure 1. The esters of oxydibutyric acid with n-butanol, n-hexanol and 2-ethyl hexanol were evaluated. These three products all have excellent plasticizing action on the vinyl resin, although the dibutyl ester is much too volatile to be of commercial interest. The dihexyl and dioctyl esters both appear worthy of further consideration as they are comparable to dioctyl sebacate in plasticizing action. These products are not yet available in this country although the General Aniline and Film Corporation is now producing some of the intermediates required for their production on a pilot plant scale.

Thiodibutyric Acid Esters: This acid was also developed in Germany from acetylene and the ester with 2-ethyl hexanol, known as Plastomoll TAH, was made on a substantial commercial scale and used in Germany in much the same manner as dioctyl sebacate was used here during the war. Like oxydibutyric acid, thiodibutyric acid is also made from butyrolactone. The chemical structure of the dialkyl thiodibutyrates is given in Figure 2. The esters of n-butanol, n-hexanol and 2-ethyl hexanol were evaluated as in the case of oxydibutyric acid. These three esters are very similar in plasticizing action to the corresponding esters of sebacic acid and appear to be extremely good plasticizers. Dibutyl thiodibutyrate is not as volatile as the corresponding oxy compound, being about intermediate between dibutyl sebacate and dioctyl phthalate in this respect. The thiodibutyric acid esters are not yet available in this country although some of the intermediate products are made in a small pilot plant by General Aniline and Film Corporation, as in the case of the oxydibutyrates.

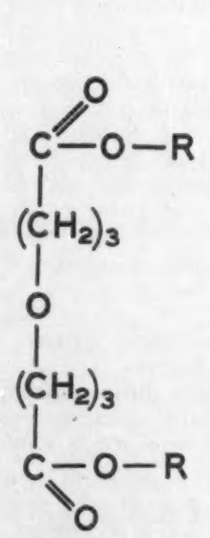

Fig. 3

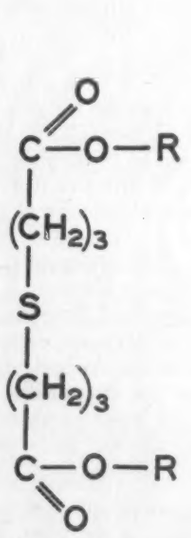

Fig. 4

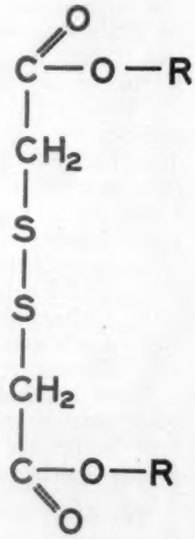

Fig. 5

(3) Dithiodiglycclic acid esters. (4) Carboxymethyl mercaptosuccinic acid esters. (5) Tetrachlorophthalic anhydride esters.

Dithiodiglycolic Acid Esters: The chemical structure of these products is given in Figure 3. It should be noted that these compounds are disulfides, while all of the other sulfur containing plasticizers tested contain a thioether grouping. Esters of dithiodiglycolic acid are available in pilot plant quantities from Evans Chemetics, Inc., who make them from monochloroacetic acid. Dithiodiglycolic acid is much simpler to prepare than thiodibutyric acid and the esters of these two acids are very similar in their plasticizing action. The butoxyethyl and octyl esters of dithiodiglycolic acid were evaluated and were found to be very similar to dioctyl sebacate. One of the outstanding properties of these two esters is their excellent thermal stability, although it will be necessary to do further work on stabilizing these materials in the presence of lead salts before they can find commercial application.

Carboxymethyl Mercaptosuccinic Acid Esters: The structure of these products is shown in Figure 4. Carboxymethyl mercaptosuccinic acid is a unique interesting chemical compound since it contains both a thioether grouping and three carboxyl groups. Esters of this acid are available in semi-commercial quantities from Evans Chemetics, Inc. The tributyl ester was evaluated and is outstanding from the standpoint of its plasticizing efficiency as shown by the low modulus figure obtained. The carboxymethyl mercaptosuccinates should have very interesting commercial possibilities.

Tetrachlorophthalic Anhydride Esters: Di-n-propyl tetrachlorophthalate is manufactured on a large commercial scale by Fries and Fries, Inc., under the trade name of Plastofries 62. This material and the corresponding dibutyl ester were evaluated and their structure is shown in Figure 5. The plasticizing action of these products is only fair but they are finding use as specialty plasticizers in applications where flameproofness and special electrical properties, combined with good stability, are required. These products should eventually help augment the supplies of tricresyl phosphate when they are available at a lower price.

Market Forge Co., Everett, Mass., has announced that its newly-designed **rider-controlled electric lift truck** is now in production. Known as the "Loadmobile," the unit enables the operator to handle it in any one of three ways: for short hauls, a folding step is provided; when the operator wants to face away from the load, a swivel seat may quickly be placed in such position; when the operator finds it convenient to face the load, the seat position can readily be adjusted.

Providing a one-tool solution to the problem of handling skids of different heights, the Yale & Towne Mfg. Co., Philadelphia, Penna., has designed a new model of its **Platform Worksaver.** The new battery-powered hand truck has a full 13-inch lift in contrast with the 2 or 3 inch lift generally found in platform models. It can handle skids ranging from 6 to 18 inches in height.

The Role of Aggregating Conditions and Particle Fusion in the Growth of Polymer Particles During Emulsion Polymerization

By C. E. RHINES and J. McGAVACK

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IN work dealing with control of polymerization reactions to bring about the formation of large particle latices, a considerable number of observations showed that large particles formed only under conditions of low latex stability which should permit growth by fusion of small polymer fragments. The topic is reviewed in this paper. Merging of particles has also been recognized as a normal phenomenon in natural rubber latex*.

Factors Affecting Particle Size

Large Particles and Low Soap Content: One of the best known means of increasing particle size somewhat is polymerization at low soap content. The common theory is that the micelle number is reduced and fewer active centers of polymerization originate. It can just as well be argued that low soap levels are inadequate to maintain a fine state of dispersion and hence permit aggregation and fusion to large particles. Runs with low soap content and with persulfate catalyst will undergo an acid aggregation as polymerization proceeds unless some measure is taken to neutralize the sulfuric acid that forms.

Variation in Particle Size with pH Variation: It is well-known that the particle size of a latex may be governed by the pH level. The addition of acid to a latex is an established means of bringing about particle enlargement. Many formulae that produce large particle latices are characterized by a relatively low pH level. This is particularly true for latices prepared with the major portion of their stabilizer in the form of anionic, surface active sulfonates or sulfates. The hydrogen ion destabilizes and enlarges in a polymerizing mixture as well as in a polymerized latex.

Formation of Large Particles in Latices Prepared with Stabilizers Other Than Soap: It has been quite commonly observed that latices prepared with anionic sulfates and sulfonates have large particles. These compounds lack the powerful dispersing action of the common soaps and hence permit agglomeration and fusion. These compounds, furthermore, are invariably associated with sodium sulfate, which exerts a powerful aggregating influence.

Salt Content and Particle Size: One of the most effective known methods of producing a large particle latex in the reactor is to add a salt. The following experiment is reported to illustrate the effect of salt content on particle size:

Effect of Sodium Sulfate on Particle Size

In this study the following formula was used (units in grams):

Butadiene	50.0
Styrene	50.0
Aquarex D (sodium lauryl sulfate)	1.0
Sodium Laurate	1.0
OEI	0.3
$K_2S_2O_8$	0.3
Water	100.0

Salt was added as follows:

CER, NB, 7-101	1	4 g. Na_2SO_4
CER, NB, 7-101	2	2 g. Na_2SO_4
CER, NB, 7-101	3	1 g. Na_2SO_4
CER, NB, 7-101	4	0.5 g. Na_2SO_4
CER, NB, 7-101	5	Control, no salt

The five samples were polymerized for 64 hours at 40° C. Early observations revealed marked retardation by the salt, particularly at the highest concentration. Observations made are shown in Table I.

The data show clearly that the high salt levels are associated with large particle formation. It is also well-known that similar salt additions can bring about a corresponding degree of particle enlargement in latices that have been completely polymerized. Here, again, the common cause for particle enlargement, in the reactor or in the final product, is the incorporation of a destabilizing agent.

Use of Low Molecular Weight Soaps: Large particle latices have been produced by use of the lower molecu-

* Lucas, Francis F., "Micro Motion Pictures of Rubber Latex," *Bell Labs. Record*, Vol. 22, p. 537 (Sept., 1944).

Table I—Properties of Latex Polymerized with Sodium Sulfate

Sample No. (CER, NB 7-101)	1	2	3	4	5
% Na_2SO_4 on water	4	2	1	0.5	0
% T.S. at end of run	*	46.7	47.1	47.2	46.6
Observations on viscosity	*	Thin	Interm.	Interm.	Viscous
Particle size observation (X-480)	Easily visible (Hevea size)	Small but visible	Invisible	Invisible	Invisible

* T.S. value not determined. This sample was thick after removing from the reactor and cooling to room temperature. This is known to be a normal property of very large particle latices at moderate soap contents. The big particles are flocculated by soap, particularly at low temperatures, and may form a floc mesh that interferes with free flowing. The presence of considerable butadiene at the end of the run indicated slow polymerization.

lar weight soaps. The theory commonly offered is that the lower soaps form fewer micelles than the higher soaps, and hence promote the development of fewer but bigger particles. It can again be pointed out that the lower soaps are relatively poor dispersing agents, and, accordingly, are expected to permit a considerable degree of agglomeration and fusion.

Monomer as an Aid to Fusion: A latex undergoing polymerization has monomers present. These monomers are solvents for the polymer that forms and dissolve, and soften the polymer. Solvent-softened polymer particles agglomerate and fuse much more readily than unsoftened particles. Hence, agglomeration is expected to take place more readily in a polymerizing latex than in a polymerized latex.

Limited Seeding Effect: If an oil phase reaction initiates in active centers and leads to the formation of particles containing many thousands of monomer molecules by an active chain and chain transfer mechanism, it should be a simple matter to extend this reaction almost indefinitely and produce very large particles. In practice, particle size growth appears to stop rather readily when the particles approximate .1μ to .3μ diameter. Furthermore, there may be no apparent size increase through seeding unless the procedure is carried out at low contents of the stabilizers known to be capable of holding a fine state of dispersion. In the absence of powerful stabilizers any particle growth that occurs is likely to be through the mechanism of aggregation.

The above reference to 0.1 to 0.3μ diameter range is not an implied statement that active centers grow to this size by polymerization. Aggregation may be prominent in forming particles of this size. Data available do not reveal where growth by polymerization ends and growth by aggregation begins.

Temperature Coefficient: Soap stabilized polymerization runs generally yield bigger particles at low temperatures than at high temperatures. The popular theory covering large particle formation at low soap content, with low molecular weight soaps or other poor soap materials or under the influence of salt additions, has already been pointed out. This theory has large particles forming because the number of micelles is limited. The addition of salt, for instance, causes soap micelles to decrease in number and to increase in size. Increasing temperature in a soap solution is accompanied by decreasing size of micelles and by an increasing number of micelles, until the temperature is reached where the micelles are eliminated. There appears to be a corresponding effect of salt addition and of temperature lowering on soap micelle size and on rubber particle size.

A flaw in the theory is encountered when one compares the soap concentration effect with the temperature effect. As the temperature is increased to the point where micelles are few, it might be expected, as is the case in dilute soap solutions, that the particle numbers would be limited. There appears to be no such range as nobody has ever reported increasing temperature to be accompanied by larger particles and by decreased reaction rate. The flaw may not invalidate the theory because smaller soap micelles (or even soap molecules) may be effective for reaction initiation at high temperatures.

The theory that particle size is predominately controlled by the stabilizing capacity of a system deals very nicely with the temperature effect. Soaps are better stabilizers, in general, at high temperatures than at low temperatures; accordingly, the high polymerization temperatures permit the retention of a high degree of dispersion.

The importance of temperature in controlling the state of dispersion can be vividly demonstrated in a latex prepared with sodium caprylate as the principal soap constituent. The latex particles are completely subvisible under the ordinary light microscope as the latex is prepared; however, particles in the Hevea latex size range form on chilling the latex in ice water for a few minutes. Particle enlargement will occur in a suitably destabilized latex very readily on chilling. Sodium salts are very effective destabilizing aids for enlargement by chilling.

Particle Growth as Polymerization Proceeds: The steady growth of particles during polymerization may be quoted as evidence of particle enlargement through taking up monomer, which is converted in the particle to polymer. It may also be claimed that this steady growth is due to progressive fusion of smaller particles as polymerization advances.

Data which show an approximately constant particle count throughout a run may also be interpreted as showing an approximately constant disperse phase surface because the monomers and polymer merge into a single phase soon after the initiation of polymerization. It is a normal expectation that a fixed amount of stabilizer will tend to hold a correspondingly fixed degree of dispersion.

Theoretical Considerations

A. *Factors Affecting Particle Size:* Large particles in latices have been observed to form whenever conditions of low stability are encountered. In a general way, it may be stated that large particle formation is favored by increasing values of the ratio, R, where

$$R = \frac{\text{concentration of monovalent cation on water phase}}{\text{concentration of surface active anion on disperse phase}}$$

The effects of cations and anions do not appear to be linear functions. Small salt additions may have no detectable effect on particle size but once enough has been added to bring about enlargement, the content becomes a critical factor. The nature of the soap is an important factor, powerful stabilizers being highly effective in keeping particles small.

It is a normal expectation that divalent cations should be more efficient than monovalent cations. This is precisely the case, but the divalent cations tend to cause coagulation of a polymerization mixture rather than particle enlargement.

Destabilizing agents other than salts, i.e., antagonistic stabilizing agents, organic solvents, etc., will have an influence on particle size. The field is too complicated to cover completely in this short paper. The concentration of the disperse phase will also have an influence on particle size. Particle collision and fusion will be more frequent at high solids levels than at low solids levels; hence, high solids levels are expected to favor large particle formation.

B. *Consideration of Particle Size and of Surface Energy Relationships:* One molecule of GR-S latex with a molecular weight of 75,000 will form a sphere of 0.006μ diameter. Table II shows the number of molecules of the same size in various GR-S particles. The surface energy relationship is also shown.

If .05μ is taken as a common particle size for GR-S prepared in the usual manner (with high soap content), it can be seen from the second column of Table II that tremendous increases in rubber content per particle occur as the particle is enlarged. Let us consider particles about 1.0μ in diameter. Particles of this size have 4,600 times as much rubber as usual particles. It follows, if

a particle grows by polymerization from only one active center, that it will take 4,600 times as long to form a 1.0μ particle as to form a .06μ particle.

Regular size GR-S particles are formed in a polymerization process occupying about 12 hours. It is commonly believed that the particles grow continuously throughout most of this period. If growth occurs in each particle only by continuous polymerization at one active center, it will take an extremely long time to form a 1.0 micron particle.

It is known that 1.0μ particles are formed in about 2 days at 50°C. in systems containing the right proportion of stabilizer and salt. As there is no reason to postulate a large increase in polymerization rate, it becomes apparent that each 1.0μ particle could only be formed from many active centers. A number of active centers may originate in each soap-monomer micelle that forms upon starting a polymerization process. Continuous formation of new centers may occur at the surface of the micelles as polymerization proceeds. Finally, as discussed in the following section, particles may fuse together as polymerization proceeds and acquire a very large number of active chains. Any of the foregoing mechanisms can be used to explain large particle growth in a reasonable time.

On looking at the third column of Table II, one sees that there is a tremendous surface-to-volume ratio at the smaller particle size range; this ratio decreases as the particles become larger. The surface-to-volume ratio is proportional to the surface energy of a disperse phase. It is readily seen that a latex made up of .06μ particles as is approximately the case with regular GR-S latex, has very much more surface energy than larger particle latex. It is in line with normal expectation that the incorporation of destabilizers in reaction mixtures leads to aggregation with its decrease in the surface energy content of the system.

At the start of any emulsion polymerization process, with soap as the emulsifying agent, a dispersion of monomer forms rapidly. The bulk of the monomer, however, remains in the system as a separate phase as the soap is able to take up only a small portion of it. As polymerization gets underway, the monomer in the separate phase passes gradually into the disperse phase. This absorption of monomer by the disperse phase must be accompanied by an increase in particle surface. The system, which was at equilibrium at the start (the monomers migrate to the micelles until equilibrium is reached), now has surface energy in excess of the stabilizing capacity of the soap present. The thermodynamic condition that favors aggregation is therefore set up soon after the initiation of polymerization.

It does not follow that particle enlargement (or coagulation) is brought about immediately on destabilizing a latex system. The polymer is extremely low in vapor pressure and in water solubility. Because of these conditions the system may remain in a thermodynamically unstable state for very long periods. There is no gradual "distillation" of rubber from the smaller particles to the larger particles. Enlargement of particles on adding destabilizers must be brought about by a fusion of two or more particles. The study of the role of destabilizers in bringing about large particle formation would be greatly simplified if equilibrium was attained rapidly in a latex system.

It would be very helpful to have a microscope that would follow the growth of particles. No such instrument exists, for even the electron-microscope does not detect molecules at low states of polymerization. Counting procedures are inaccurate, particularly in the very fine particle range where the low molecular weight particles may not be detectable by any known device. It is even impossible to tell anything of the nature of particle growth with fairly accurate particle count data because particles may grow by direct polymerization or by fusion of small particles that originate and develop continuously during the polymerization process, particularly at early stages when there is adequate soap. In short, there is no information that tells precisely how particles grow.

TABLE II—PARTICLE SIZE AND SURFACE

Diameter in microns	Molecules per Particle (M. W. = 75,000)	Ratio in Surface Volume cm^2/cm^3 (Relative Surface Energy)
.006	1	10,000,000
.06	1,000	1,000,000
.1	4,600	600,000
.5	580,000	120,000
1.0	4,600,000	60,000
5.0	580,000,000	12,000

In a polymerization mixture containing a considerable quantity of salt, or of other destabilizer, the monomer dispersion that forms is in an aggregated condition. The dispersed soap-monomer particles are bigger than in a mixture lacking the salt. As a result, the water soluble catalyst does not have a normal degree of contact with the oil phase and polymerization is relatively slow. There are necessarily fewer soap-monomer centers for polymerization in the presence of salt, and these centers along with their large size have more surface than the smaller centers formed without salt.

Further Theoretical Considerations

The normal expectancy is that many reaction chains will originate in the large centers where few reaction chains will originate in small centers. The centers with the large number of chains can grow to the larger particle sizes illustrated in Table II. Aggregation is expected to occur continuously as the free monomer layer passes into the polymer particles, according to the principles discussed in preceding sections. The presence of a destabilizer, as salt, prohibits completely the formation of fine dispersions.

A special case may arise when low molecular weight soaps or other poor soaps are dealt with. These substances have little tendency to form micelles and are poor stabilizers. Small salt additions may induce micelle formation and improve their stabilizing capacity. Higher salt additions will, however, invariably ruin their stabilizing capacity. Good stabilization is associated with stabilizers that form micelles.

The soap micelle may well be the main locus of activation in the high soap formulae used for production of fine particle latices. There is ample reason to believe that the formulae which produce high solids, big particle latex through the incorporation of salt may depend to a very considerable extent on the particle surface and on soap that remains in solution for reaction initiation. These runs are relatively slow and allow a long period of catalyst-monomer contact at the polymer particle surface and in the soap in aqueous solution. It is also to be kept in mind that a higher proportion of the soap than normal will be in solution as a result of the displacing capacity of the salt.

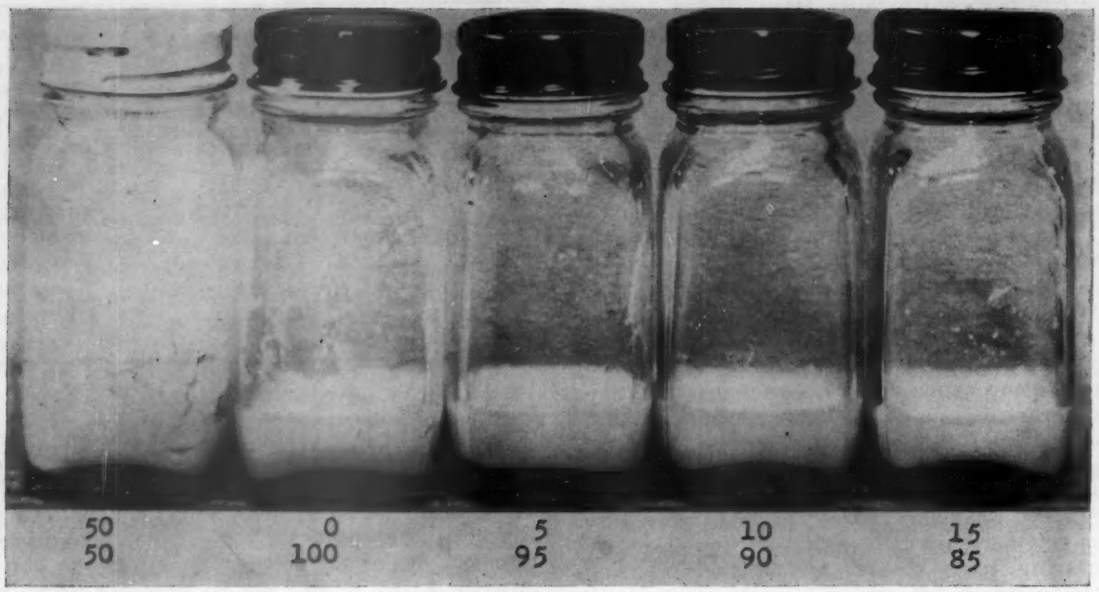

FIG. 1—Particle Enlargement — Caprylate Process. Butadiene/Styrene ratios shown.

Flocculation Phenomenon Not Associated With Particle Enlargement

The expression "fusion" or "agglomeration and fusion" has generally been used in this paper to designate the phenomenon where two or more particles come together and fuse into a large particle. An entirely different flocculation phenomenon is encountered in hydrocarbon type dispersions of moderate particle size or large particle size. Large particles cluster into distinct groups on addition of a moderate amount of soap or related stabilizer. Brownian motion ceases. The change is very similar to the change induced by alginate or other creaming agents. Fusion does not occur. In fact, the latices are highly stabilized by the added soap and redisperse immediately on diluting to reduce the soap content.

Flocculation is progressively easier to bring about as particle size increases in a dispersion. Chilling aids flocculation and raising the temperature causes dispersion of flocs. Salts, like soaps, cause flocculation and aid flocculation with soaps. Salt additions, of course, cause destabilization and if carried far enough, may destabilize to the point where coagulation or particle fusion and enlargement occur. It is quite likely that particles form clusters in all enlarging processes, fusion occurring when the system is adequately destabilized.

It should consequently be kept in mind that there is a flocculating phenomenon in latices that is not accompanied by particle growth but is highly important because of its creaming agent-like action and because it has a separate importance in the regulation of concentration processes and in latex viscosity control.

Phenomena Associated With Plasticity of the Disperse Phase

It is inherent in the theory of enlargement by fusion that fusion can occur only when particles are plastic enough to flow together. All ordinary GR-S type polymer particles appear to be fluid enough to flow together. Three types of behavior have now been encountered, depending on the plasticity of the polymer particle on exposure to the destabilizing circumstances that normally cause enlargement. These are:

1. *Soft Polymer:* The particles enlarge. GR-S polymer and other rubberlike substances undergo particle enlargement readily.

2. *Hard Polymer:* The particles remain small. The moderate destabilizing conditions that bring about fusion of soft polymers are ineffective, probably due to the failure of the hard particles to stick together and fuse. Polystyrene or GR-S with 85% styrene or more fall in this zone.

3. *Particles of Intermediate Hardness:* Coagulation occurs. Particles with enough tack to stick together but too hard to fuse, form coagulum when destabilized to the extent that causes enlargement with softer polymers. This phenomenon may be expected in a polystyrene dispersion with about 20% of plasticizer, a mixture of

TABLE III—CHANGES IN DESTABILIZED DISPERSIONS OF VARIED PLASTICIZER CONTENT

Parts dibutyl phthalate per 100 of polymer....	0	12	24	35	47
Change on chilling (480X magnification).....	No change	Coagulated (some big irregular particles in serum)	Very small (visible particles formed)	Small visible particles formed	Particles in small Hevea range formed
Film	Brittle	Pliable, but very stiff	Pliable	More pliable	Most pliable

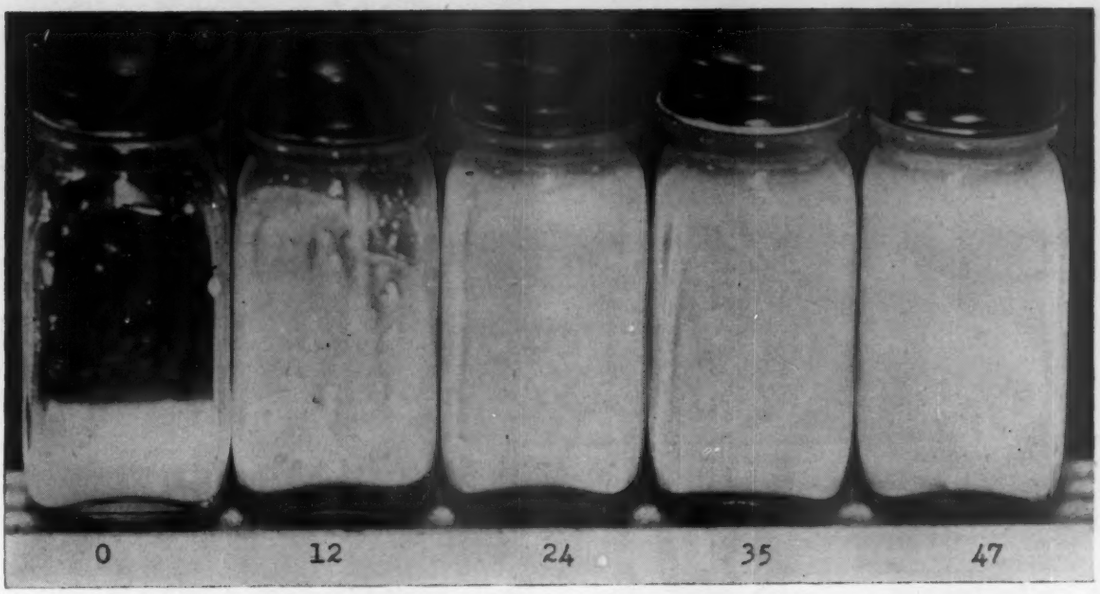

FIG. 2—Plasticizer Content and Particle Enlargement of 15 Butadiene-85 Styrene Polymer. Parts of dibutyl phthalate shown.

equal parts of GR-S and polystyrene dispersions or in similar systems.

Coagulum formation appears to be due to a tree-like growth of particles, with consequent interlocking of many irregularly shaped particles. The hard coagulum formed is characterized by a considerable proportion of void space.

Experiments that illustrate the preceding principles follow:

Polymers Too Hard To Fuse

Latex was made according to the formula (in grams):

Monomer	100.0
Nacconol NRSF	1.0
Sodium Oleate	0.3
OEI	0.3
Sodium Caprylate	7.0

Water to a 252 gram total for sample

The monomer content was varied as follows:

A. 50 butadiene and 50 styrene
B. 100 styrene
C. 5 butadiene and 95 styrene
D. 10 butadiene and 90 styrene
E. 15 butadiene and 85 styrene

The samples were polymerized 30 hours at 50° C.

Sodium caprylate was included because of its property of causing particle enlargement when a chilling operation is carried out. A small portion of each latex was poured into a one-ounce bottle and immersed in 8° C. water for 10 minutes. All the latices before chilling had invisible particles (light microscope) and the characteristic semi-transparent films of small particle products. The four samples with high styrene contents were unchanged on rewarming to room temperature but the polymer from equal parts of butadiene and styrene had undergone the customary enlargement to Hevea size particles. Figure 1 shows bottles after shaking. The enlarged particle product has a very opaque film while the other films (above the latex level) are very transparent. The opaque film is characteristic of large particle latices.

Varied Plasticity in the Disperse Phase

A further study was made on the sample with the 15-85 butadiene-styrene ratio. Samples were stabilized by the addition of 5 grams of 10% sodium oleate per 100 grams of latex and rotated at 50° C. overnight with dibutyl phthalate. The dibutyl phthalate dispersed in the hydrocarbon component. Samples in one-ounce bottles were now chilled 10 minutes in 8° C. water. Table III illustrates the changes that occurred.

The table illustrates all the phenomena exhibited by latices of polymers of various plasticities. The most brittle material had particles too low in tack to stick together. The three latices with the softest particles underwent agglomeration and fusion. The intermediate sample coagulated. Figure 2 shows the latex samples after chilling with the coagulum at 12 parts of plasticizer and the opaque films of the large particle products.

It has also been observed in this laboratory that hard polymers cannot be handled in a polymerizing formula that contains a destabilizer, as salt, which normally gives a high-solids, large particle product. Polymerization of polystyrene proceeds normally to about 90% conversion. The latex then changes to coagulum. Normal polymerization to concentrated latices can be carried out if a plasticizer is incorporated in the formula to soften the disperse phase. This observation constitutes a powerful bit of circumstantial evidence in demonstration of the importance of particle fusion in formulae that produce large particles. Coagulation occurs in the reactor when the critical degree of polymer hardness is encountered, when a destabilizer is present just as in a direct enlargement process.

Particles too hard to fuse or coagulate will be encountered in the reactor only as 100% conversion is approached because of the plasticizing action of monomers.

Demonstration that Small Particles Cannot Survive in a Polymerizing System that Produces Large Particles

A fine particle polystyrene latex was produced by polymerizing the following formula for 22 hours at 50°C. (units in grams):

Polystyrene Latex

Styrene	70.0
Sodium Oleate	8.0
$K_2S_2O_8$	0.1
OEI	0.2

Water to a 350 gram final total weight

On completion of the polymerization reaction, the sample was treated with 4 grams of 10% ammonia and 0.05 grams of potassium hydroxide. Ammonia is a powerful inhibitor at high pH levels and was used to kill the reaction. The ammonia was removed in a stripping operation, with the sample being returned to its original 350 grams total weight. The total solids content was 20.9%.

Two latex samples were now prepared by a formula known to produce high solids, large particle latex:

TABLE IV—ELECTRON MICROSCOPE INFORMATION

	Type of Particle	Diameter Microns
Polystyrene latex	Polystyrene type particles	.02 to .1 larger particles predominating
Control latex	GR-S type particle shadow/dia. ratio was 1.07	0.4
Polystyrene seeded latex	GR-S type. Shadow/dia. ratio was 1.22	0.38
Mixture of Polystyrene and Control latex, stabilized	Mixture of Polystyrene type particles and of GR-S type particles. Polystyrene particles .02 to .1 microns diameter, with shadow/diameter ratio of 5. GR-S particles 0.4 microns diameter (5 Polystyrene particles to 1 GR-S particle).	

CONTROL LATEX (NO POLYSTYRENE)
(*weight in grams*)

Butadiene	50.0
Styrene	50.0
Nacconol NR	2.5
Sodium Oleate	1.14
OEI	1.0
$K_2S_2O_8$	0.3

Final weight adjusted to 175 grams with water

LATEX SEEDED WITH INACTIVE POLYSTYRENE
(*weight in grams*)

Butadiene	45.0
Styrene	45.0
Nacconol NR	2.5
Polystyrene Latex	50.0
OEI	0.9
$K_2S_2O_8$	0.3

Final weight adjusted to 175 grams with water

The polystyrene latex was added to the warmed solution of Nacconol NR and $K_2S_2O_8$ dissolved in the total water required in the formula. No blending trouble was encountered. The styrene, butadiene, and OEI were then added. Both samples were polymerized at 50°C. for 112 hours.

It can be calculated that the two above formulae are alike in containing 100 grams of polymer or polymerizable constituents, 2.5 grams of Nacconol NR, 1.14 grams of sodium oleate (added with the polystyrene in second formula), 1.0 gram of OEI (partly added with polystyrene), 0.3 grams of $K_2S_2O_8$ and equal quantities of water. They can be regarded as equally well stabilized.

On completion of polymerization, all three of the above samples were examined by means of the electron microscope. At the same time a mixture of the polystyrene latex (10 parts polystyrene) with the control GR-S latex (90 parts GR-S) was made. This blend was prepared after diluting the control and adding soap to assure a stable system. All samples were gold-shadowed and examined. Results are tabulated in Table IV.

Electron microscope pictures are given to illustrate the ease with which polystyrene particles can be distinguished from GR-S particles.

A number of similar experiments have been run with GR-S of very high styrene (85%) content used instead of polystyrene. This high styrene content polymer is easily distinguishable from GR-S by the electron microscope. The results have invariably been the same; small particles added to the system that yields big particles, aggregate and fuse with the big particles. Some of these electron microscope pictures are given.

The formulas used above to give large particles are dependent on the salt in the Nacconol NR (55%) for their ability to form larger than usual particles and to run to high solids values. The Nacconol NR-containing latices went to 60% total solids during polymerization and were substantially completely converted. These latices, examined under the ordinary microscope at a magnification of 480X, were seen to be composed mainly of particles in the barely visible range. The polystyrene seed latex had completely invisible particles.

It is quite possible that polymerization was resumed in most of the polystyrene seed particles on mixing with fresh monomer and catalyst. If the polystyrene type particles had grown, however, without fusion, the resultant dispersions would have had considerably smaller (about 1/5 the volume) particles than the unseeded control particles. The pictures show distinctly that this is not the case. The measurements made show the polystyrene seeded particles to be of slightly greater volume because of their greater height, than the control particles. The pictures of seeded latex also reveal, particularly on the original negatives, dense areas within particles which appear to be made up of a number of polystyrene type particles.

Description of Pictures (Fig. 3)

A, B, C and D

A, B, C and D are pictures at 12,000 magnification of the samples described in the preceding experiment. "A" shows the polystyrene seed. "B" shows the large particle GR-S latex (control). "C" shows the GR-S prepared with 10% of polystyrene (A) seed. Note that the seed has been taken up in the large GR-S particles. "D" shows a mixture of the polystyrene seed (10%) and the GR-S control (90%), mixed after adding extra soap and diluting to stabilize the latex. Note that the polystyrene particles are clearly distinguishable from the GR-S particles and that there are more polystyrene particles than GR-S particles.

E, F, G and H

This is a group of samples comparable to samples A, B, C and D, respectively. The seed polymer, in this group, was 79% styrene, 7% acrylonitrile, and 14% butadiene, instead of all styrene, and potassium oleate was used throughout instead of sodium oleate. "E" is the polystyrene type seed, "F" is the GR-S control, "G" is the seeded GR-S run, and "H" the stabilized mixture of seed and GR-S.

I, J and K

"I" is a polymer made up of 90% styrene, 3% acrylonitrile, and 7% butadiene. The inactive seed particles, "I", were added to a large particle GR-S formula, "J", forming 5% of the total polymer. The "K" sample is an unseeded control for comparison with the "J" sample.

L, M, N, O and P

"L" is the GR-S control for this group. The monomer ratio is 60-40 butadiene-styrene. "M" represents the polystyrene seed, 20% of which was added to the large particle GR-S formula, "N". The monomers added with the 20 parts of seed consisted of 60 parts of butadiene and 20 parts of styrene, which leaves the styrene imbedded in a high butadiene ratio polymer. Sample "O" is like "M", except for consisting of 85% styrene and 15% butadiene, instead of all styrene. "P" shows a large particle formula GR-S seeded with 20% of sample "O." The high styrene content seed is imbedded in 75-25 butadiene-styrene GR-S.

This set of experiments has demonstrated the validity of the preceding theoretical considerations; it is impos-

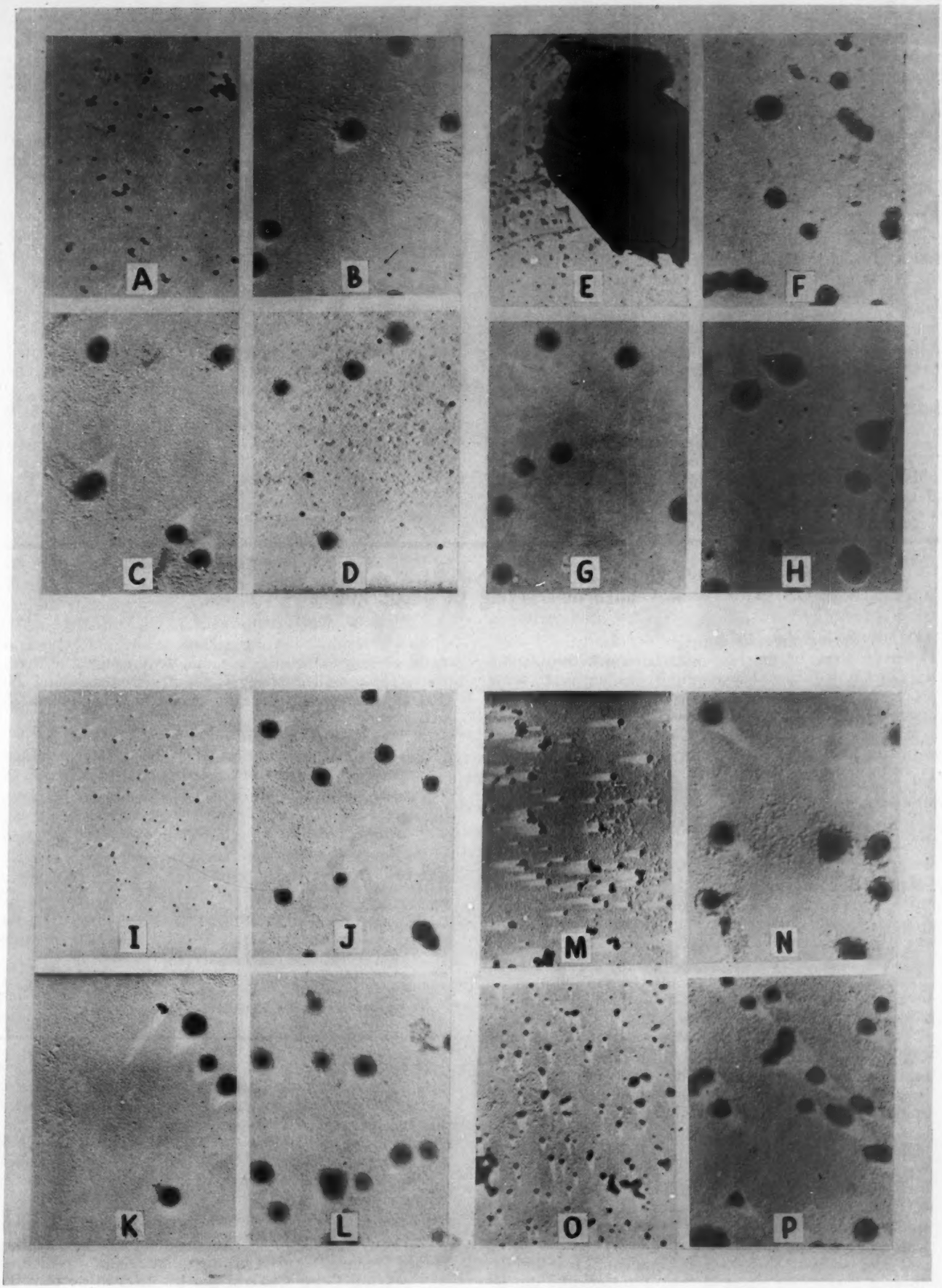

FIG. 3—Electron Microscope Pictures: 12,000X. (See text for description).

sible for small polymer particles to survive in an unstable system. Under conditions of low stability, fusion of particles occurred, the smaller particles merging into bigger particles. The complete disappearance of small polystyrene type particles on exposure to the unstable system producing large particles is excellent support of the view that their high surface energies causes them to agglomerate readily.

General Application of the Theory

The view that particle size will be proportional to the condition of stability existent in the polymerizing system has enabled us to regulate particle size very effectively and to predict the effects that various conditions or reagents will have on particle size. Destabilizing aids of various types favor large particle formation; stabilizing aids of various types favor small particle formation. A large amount of research and production experience has proved the soundness of these views.

Summary and Conclusions

Summary: 1. Large particles form during emulsion polymerization only under conditions of relatively low stability. These destabilizing conditions may be brought about by:

a. Low soap content.
b. Poor soap.
c. Low pH.
d. Salts, particularly sodium salts and other destabilizers.
e. Low temperatures.

2. It is inherent in the fusion theory that the disperse phase must be soft enough for particles to fuse together if enlargement is to occur. Hard dispersions do not enlarge when destabilized.

3. It has been demonstrated that small polymer particles cannot survive in polymerization runs that produce big particles. The small particles enter the big particles that form.

4. High soap content causes flocculation of large particle dispersions. This flocculation is reversible; fusing and enlarging do not occur.

Conclusions: 1. The particle size of a latex formed by emulsion polymerization is determined almost entirely by the stabilizing capacity of the medium.

2. Particles grow as polymer forms in the disperse phase but the agglomeration and fusion of small particles share an important role in the formation of large particles.

Presented before the Rubber Division of the Chemical Institute of Canada, Montreal, Canada, June 9, 1948.

Infra-Red Drying of Sheet Rubber

WHEN during the war supplies of raw rubber were scarce, some of the raw material which the Dunlop Rubber Co. had to utilize required washing after being processed into sheet form, according to an article which appeared in *Rubber Developments* (Vol. 1, No. 4), publication of the British Rubber Development Board, London, England. Drying, however, proved to be a serious problem, since air drying took one to three weeks and valuable factory space was being occupied for excessively long periods.

In conjunction with Metropolitan Vickers Electrical Co., the Dunlop Co. carried out exhaustive investigations into the practical possibilities of Infra-Red heating. A "Metrovick" Infra-Red pilot plant was installed to enable further tests to be carried out on a production scale, by which means the Dunlop engineers obtained essential operational experience on this form of drying and also provided design data for the main plant. It proved to their satisfaction that the evaporation of moisture from washed sheet rubber by Infra-Red eliminated a serious production bottleneck.

The next step was the installation of the main production plant which incorporated 624 Metrovick Infra-Red lamps and reflectors. The actual heating section is 40 feet long; with conveyor, including loading and unloading positions, the overall length is 75 feet. The total lamp loading is some 190 kw, which is somewhat higher than usually expected from 624 lamps rated 250 watt, but is due to the fact that the lamps are run at higher voltage than the normal 115 v. but within the specified range for this type of lamp.

The plant is constructed in tier form. Initially the wet sheet rubber is fed under the top tier of lamps and one side of the sheet is irradiated for the first 40 foot pass. The sheet is then automatically doubled back on the conveyor through the center 40 foot pass, thus exposing the other side of the sheet to the lamps. The final lower 40 foot pass is without lamps and constitutes a residual heating section. The time taken to travel at a speed of 4.5 per minute through the three passes for complete drying is about 27 minutes, and the feed constitutes two continuous sheets, each about 20 inches wide.

Initial moisture content is 10% to 12% of the dry weight and final moisture content 1.2% to 4%. Average moisture content dried out is from 8% to 10%.

Some interesting figures of results obtained are as follows:

	Test 1	Test 2	Test 3
Temperature of rubber end of first pass	107° F.	101° F.	94° F.
Entering the second pass	57° F.	48° F.	60° F.
End of second pass	116° F.	99° F.	109° F.
Initial Moisture content	—	10.2%	11.2%
Final Moisture content	1.2%	1.2%	3.6%
Daily operational hours	13		
Consumption per day	2474 kWH		
Output lb. of rubber per day	10246		
kW. hours per lb. of rubber	0.24		

Weighing only two pounds, including capacity load of fuel, a new **Vulco heating and brazing torch,** for use on hard or soft solders, has been introduced by the Furlo Sales Co., 521 No. La Cienga Blvd., Los Angeles 36, Calif. The new torch has no cumbersome hose and starts immediately without pre-heating. An average size working flame will burn 10 to 12 hours continuously on one fuel filling.

A new approach to the problems of controlling odors of manufactured products has been provided by the **Maskol Odor Control Set** introduced by Cargille Scientific, Inc., New York City. The set contains 1-ounce quantities of 12 different odor masking agents now used successfully in numerous industries.

Editorials . . . . . .

Rubber Production

ACCORDING to reports from rubber-producing areas in the Far East, as compiled by the U. S. Department of Commerce, the production of natural rubber this year will comfortably exceed the estimates made early in the year. This in spite of the labor difficulties which have beset the Malayan area throughout the year, the strife in Indonesia, and the generally unsettled conditions in other rubber-producing areas in the East.

The Commerce Department's figures, as compiled by E. G. Holt, rubber advisor, indicate that between 1,450,000 and 1,500,000 long tons of natural rubber will be produced in the Far East before the end of the year. This compares with an estimate of 1,391,000 long tons made at the last meeting of the International Rubber Study Group, and represents an increase of from 59,000 to 109,000 tons. Since production of synthetic rubber will approximate 500,000 long tons, a total of some 2,000,000 tons of new rubber, natural and synthetic, should be available to world industry this year.

When the Rubber Study Group issued its last estimate of 1,391,000 long tons of natural rubber production for 1948, there were serious misgivings as to ample supply, especially in view of the fact that the United States was launching its stockpiling program, as prescribed by law. Based on world consumption estimates at the time, it was estimated that only some 80,000 tons would remain between production and consumption, and if stockpiling accounted for 100,000 tons or more a shortage in the amount available to the American rubber industry would occur. This could, of course, have resulted in a runaway price market.

As the Commerce Department points out in its report, it is fortunate that the production of natural rubber is exceeding the earlier estimates, because domestic consumption is following the same trend. Although estimates made at the beginning of the year set domestic 1948 rubber consumption at approximately 950,000 tons (with some estimates running as low as 900,000 tons) it is now evident that it will be closer to 1,050,000 tons, or about 10 per cent higher.

Since total world supply of new natural and synthetic rubber this year will amount to approximately 2,000,000 long tons, and total foreign demand for such rubber is expected to amount to 825,000 tons, the United States should have available some 1,175,000 tons. This total, along with ample supplies of reclaimed rubber, should satisfy the government's stockpiling program as well as the requirements of domestic rubber manufacturers.

The upward revision of domestic consumption was forced in large part by the surprising behavior of tire production. Despite the drastic curtailment of tire production, especially passenger tires, predicted by the economists, it has held up substantially. Production of pneumatic casings totaled 7,851,000 units in January, dropped to 6,385,000 in February, jumped to 6,930,000 in March, slipped to 6,574,000 in April, and advanced to 6,931,000 in May. Although production for the first five months of 1947 amounted to 41,438,000 units as compared with 34,671,000 in the first five months of this year, the latter figure was considerably above the estimated total for the period.

In addition to the tire branch of the industry, the mechanical goods field is accounting for a substantial portion of current rubber consumption. As pointed out in our editorial of last month, the mechanical rubber goods business has practically doubled in volume since prewar days, with some companies reporting that their production of such rubber goods is ten times greater today than it was in 1941. Another barometer as to current demand for mechanical goods is found in the expanding activities of companies already in the business as well as the number of soundly-financed new companies entering the field. Among the latest expansion programs announced, is the decision of Goodrich to build a new multi-million dollar plant for the production of industrial belting in Akron. The plant will have over 150,000 square feet of working area.

Also to be kept in mind is the continuous development which results in more and more new rubber products, such as conductive rubber panels for heating applications, rubber springs for transportation vehicles, foamed latex sponge for mattresses and upholstery, and the hundred and one other new developments reported in recent years. The laboratories of the rubber companies are constantly striving—and succeeding—in developing new products which can quickly be transferred to the production lines. Each development adds to the promise of increased rubber consumption.

CURRENT NEWS OF THE MONTH

PHILBLACK CARBON BLACKS TO BE PRODUCED IN ENGLAND

The Phillips Petroleum Co., Bartlesville, Oklahoma, has granted the Palatine Development Co., Ltd., London, England, a license to manufacture, in the United Kingdom of Great Britain and Northern Ireland, the Isle of Man, the Channel Islands and Eire, in accordance with the Philblack process, and to sell throughout the world the two types of carbon black known as Philblack A and Philblack O, according to an announcement made by Frank Phillips, chairman of the board, and K. S. Adams, president.

According to the announcement, the Palatine company plans to construct a plant immediately at Avonmouth, near Bristol, with a capacity of 50,000,000 pounds of Philblack per year. Capital for the proposed plant is being arranged by Dawnay Day and Company, Ltd., investment bankers of London. Head Wrightson Processes, Ltd., London, has been retained by the Palatine company as consultants. R. W. Greeff and Company, Ltd., will serve as the sales agent for this new venture.

Colonel C. P. Dawnay, a director of Dawnay Day and Company, Ltd., and a director of Palatine Development Company; Mr. H. A. Curran, a director of Greeff Chemicals Company, Ltd., (Manchester), sales subsidiary of R. W. Greeff and Company, and Dr. Raoul C. Fisher, Technical Director of Head Wrightson Processes, Ltd., are now visiting in this country making final arrangements for the construction of the Philblack plant.

The project being initiated by the Palatine Development Company will be the first carbon black plant employing a proven U. S. process to be built in the United Kingdom. Current consumption of black in the British Isles is now approximately 85,000,000 pounds per year requiring an outlay of about $10,000,000.

Philblack "O" is a high abrasive furnace (HAF) black manufactured by an exclusive Phillips process from liquid hydrocarbons and, therefore, is ideally suited to production in England where natural gas is not available. Philblack "A" is a high modulus furnace (HMF) black also made from liquid hydrocarbons. Phillips is currently exporting in considerable volume both Philblack "A" and Philblack "O" to England.

The New England Materials Handling Exposition, Boston, Mass., will hold its first show at Mechanics Hall, Boston, October 5, 6 and 7, 1948. Manager for the show is R. Kennedy Hanson, who is secretary-treasurer of the National Materials Handling Institute.

Rubber "Shoed" Mowers

At least 99 out of every 100 lawn mowers currently being produced are equipped with rubber tires. This climaxes a trend well under way before the war, according to R. A. Maxwell, sales manager for original equipment tires of the B. F. Goodrich Co., Akron. In 1941, two out of every three mowers were being "shoed" with rubber. The same evolution is reported to be taking place in wheelbarrows, both of the industrial and garden types, with at least 80% of today's wheelbarrows gliding on rubber, twice as many as prewar.

Goodyear Program Shortwaved

"The Greatest Story Ever Told," the radio program which dramatizes the teachings of Christ and which is broadcast in this country over the ABC network by the Goodyear Tire & Rubber Co. as a public service program, is now being broadcast to the entire world through the facilities of the World Wide Broadcasting Foundation. More than fifty-eight countries will hear the broadcasts as they are shortwaved through stations WRUL, WRUW and WRUX. Shortwave broadcasting through these stations began on July 25, and will continue indefinitely. The programs will be broadcast from the recordings of the original programs as heard in this country.

General Tire Buys Jet Plant

General Tire & Rubber Co. has purchased a controlling interest in Marquardt Aircraft Co., Azusa, Calif., the nation's foremost producer of Ramjet engines. The new General plant is now engaged in research and development of jet airplane engines. Roy E. Marquardt, former director of aeronautical research at the University of California, founded the firm in 1944. He will remain in charge of the Ramjet plant with William H. Thomas as general manager. General Tire also controls the Jato engine plant at Azusa, and operates a research program at Pasadena, Calif.

Dewey & Almy Chemical Co.

First Half: Consolidated net profit of $322,258, or $1.01 each on 319,949 shares, which compares with $335,351, or $1.09 a share, for the corresponding period last year.

MORE NATURAL RUBBER AVAILABLE THAN WAS PREVIOUSLY ESTIMATED

According to the Department of Commerce, there will be quite a bit more natural rubber available this year than was previously estimated. The Department reported that an improved production picture in Malaya, Indonesia, and other key rubber producing areas permitted a new estimate on world production of natural rubber during 1948 at between 1,450,000 and 1,500,000 long tons.

The Department had previously accepted the 1,391,000 long ton estimate of the International Rubber Study Group. The new estimate represents an increase of from 59,000 to 109,000 long tons. The improved outlook came just in time, for the U. S. rubber industry has increased by 10% its estimates of how much new rubber it will need this year. The industry figures it now will need about 1,050,000 long tons of new synthetic and natural rubber, compared to a previous estimate of 969,000 long tons.

With synthetic production adding slightly more than 500,000 long tons to the total amount of new rubber available this year, the Commerce Department now estimates that the total world supply of new synthetic and natural in 1948 will be slightly better than 2,000,000 tons. Foreign demand for new natural and synthetic is now placed at around 825,000 long tons, which leaves approximately 1,175,000 long tons for the U. S.

This total, the Commerce Department says, along with ample supplies of reclaimed rubber, should satisfy the Government's stockpiling program as well as the requirements of domestic manufacturers. Commerce Department officials said that there are no changes contemplated in present regulations stipulating how much synthetic rubber must be used in tires and tubes.

More Companies Sign With Union

Following the trend established by the larger rubber companies in coming to terms with the URW as reported in the last issue of RUBBER AGE, the smaller companies are falling into line and concluding agreements with the union. An eleven-cent an hour wage increase was general, and most contracts included provisions for vacations with pay and overtime arrangements. Companies signing union contracts recently include Seiberling, Dayton and Mohawk.

The western division of the Monsanto Chemical Co. has opened a new adhesives and coatings manufacturing plant at Decatur, Ill., to replace its Portsmouth, Va., operation.

PRODUCTION OF CASINGS IN MAY INCREASES OVER APRIL TOTALS

Production of passenger car casings during the month of May was 5,719,740 units, an increase of 6.46% over April when 5,372,651 units were produced, according to a recent report of the Rubber Manufacturers Association. Truck and bus casings produced in May totaled 1,211,053 units, compared with the 1,201,083 units produced in April. Total casings produced during May were 6,930,793 units, against the 6,573,734 produced in April.

Passenger casings shipped in May came to 5,109,644 units. In the previous month, 5,851,626 units were shipped. Truck and bus casings shipped in May amounted to 1,144,771 units, while in April, 1,186,940 units were shipped. Total automotive casings shipped in May were 6,254,415 units, compared with 7,038,566 units in April.

Passenger and truck and bus tubes produced in May totaled 5,701,812 units, while in April, 5,578,459 passenger and truck and bus tubes were produced. In May, 5,419,194 tubes were shipped, against the 5,806,542 tubes shipped in April.

Inventories of passenger casings on May 31 showed 9,448,439 units, compared with the 8,858,055 units inventoried at the end of April. A total of 2,162,669 truck and bus casings were inventoried on May 31, against 2,082,228 units in April. An inventory of total automotive casings on May 31, revealed 11,611,108 units, compared with the 10,940,283 units inventoried at the end of May. A total of 10,068,828 tubes were inventoried on May 31, compared with 9,737,206 units the month before.

Durez Plastics Settles Strike

About 450 workers at the North Tonawanda, N. Y., plant of Durez Plastics & Chemicals, Inc., have returned to work following a strike which closed the plant for several weeks. The new contract calls for a 14c an hour across the board increase for all employees with additional adjustments in the hourly increase for 124 of the workers, spokesmen for the United Electrical, Radio and Machine Workers of America, C.I.O., said. The two-year contract contains a clause providing for reopening wage talks one year after the effective date of the contract. The agreement calls for six paid holidays, and paid vacations of three weeks after 15 years service.

Changes Freight Price Basis

Wellington Sears Co., mill agents for industrial fabrics, is now quoting the products of the textile mills represented by it on an f.o.b. plant basis with no freight allowance. The new price basing system, which went into effect on July 12, was in line with the recent Supreme Court decision in which the multiple basing point price system in use by the cement industry was outlawed. The Federal Trade Commission defined the system as a device by which prices, including freight charges, are set at certain agreed-on places, rather than actual shipping points.

Rubber and Cork Newspaper Blankets

The Goodyear Tire & Rubber Co. is now making a stereotype-mat blanket composed of rubber and fabric designed primarily for direct pressure newspaper mats. The mat is produced in the standard 26 x 30-inch size, one eighth of an inch thick. Another new Goodyear product is a cork blanket of uniform gauge, impregnated wtih a special, oil-resisting compound designed to eliminate all swelling due to oils. A low-stretch fabric is utilized, so that the blanket will not "walk" on the press. The company is now in production on its new "blue" newspaper print roller. The roller does not swell, retains its original hardness, and gives long service before and between regrinding, company officials stated.

Rubber Cushions the Subway

Rubber pads made by the B. F. Goodrich Co., will cushion the rails in the new Dearborn St. section of the Chicago, Ill., subway. More than 40,000 pads, each with four rubber washers, will be made for the Dearborn development. This represents some 70,000 pounds of rubber. Fitting snugly to the wooden ties, the rubber will reduce both noise and vibration, engineers say. The pads measure 7 x 12 inches and are about ¾ inch thick. A series of holes in the rubber makes the pads more elastic. Laying of the rails on the Dearborn St. project is expected to be completed by January.

ACS To Meet in Detroit

The Fall Meeting of the Division of Rubber Chemistry, ACS, will be held in Detroit, Mich., on November 8, 9 and 10, at the Book-Cadillac Hotel. The first session is scheduled to start on Monday, September 8, at 2:00 p.m. Dr. C. W. Selheimer is chairman in charge of all local arrangements, and he and his committee are planning for a banquet on Tuesday night, November 9, following a general cocktail party which is being arranged by a committee of suppliers, headed by George Horsfull. Members wishing to contribute papers for presentation at the meeting are advised to have abstracts of from 200 to 250 words in the hands of the secretary, C. R. Haynes, Binney & Smith Co., 41 East 42nd St., New York 17, N. Y., by September 24.

Brockway Elected Thermoid Officer

At a recent meeting of the board of directors of the Thermoid Co., Trenton, N. J., Carl Brockway was elected a vice-president of the company. Prior to his becoming associated with Thermoid in 1941, Mr. Brockway was president and general manager of Worldbestos Corp., a brake-lining manufacturing concern. In his new capacity, he will be responsible for all production of brake lining, clutch facings and other friction materials. Before entering the friction materials industry, Mr. Brockway was associated with the automotive industry.

FIRESTONE FOAMED LATEX MATTRESS GETS UNUSUAL RESILIENCE TEST

Babe, one of the elephants of Ringling Brothers and Barnum and Bailey Circus, tests the softness and resilience of the world's biggest foamed latex mattress, used by Ugo Bogino in his springboard leap over the backs of Babe and four other elephants. Made especially for the circus by the Firestone Industrial Products Company, the mattress is 9 feet long, 5 feet wide and 16 inches thick. Billions of tiny air bubbles, whipped into the foamed latex in processing, assure safe landings for the performer as he strikes the pad with terrific force.

RUBBER DIVISION MEETING IN LOS ANGELES ATTRACTS 160 MEMBERS

The meeting of the Division of Rubber Chemistry, A. C. S., held at the Hotel Mayfair in Los Angeles, Calif., on Thursday and Friday, July 22 and 23, attracted approximately 160 members and guests. Although the registration was somewhat disappointing, since some 300 were expected, the meeting was an unqualified success.

It was the 53rd meeting of the Rubber Division and the first one held in the Los Angeles area. It was emphasized at the meeting that subsequent Division functions in the area will depend upon total paid membership in the area, since obviously it is too far distant from other rubber centers to attract attendance from such centers.

The meeting, which was a regular meeting of the Division and not a regional one as first planned, featured the presentation of twenty-one technical papers, all of which were delivered as per schedule, in addition to the presentation of the Goodyear Medal to Dr. David Spence, a business meeting, and the Division banquet. The Suppliers' Cocktail Party, which has become a regular function of Division meetings, although conducted apart from official Division activities, preceded the banquet. Both of these functions were held at the Biltmore Hotel.

Immediately following the two-day meeting of the Rubber Division in Los Angeles, the regular annual two-day outing of the Los Angeles Rubber Group was held at Catalina Island. Full details of this outing, unique among those held by all other local rubber groups, will be found elsewhere in this issue. Complete abstracts of the twenty-one technical papers presented at the Division meeting were published in our previous issue. Copies of these abstracts were distributed at the meeting through the courtesy of both the *India Rubber World* and RUBBER AGE.

Hold 25-Year Club Luncheon

Activities at the Division meeting, after registration on the morning of the first day, July 22, started with a luncheon of the Twenty-Five Year Club at the Hotel Mayfair, with 42 "old-timers" in attendance. Ray Morath (Naugatuck Chemical) was in charge of arrangements for the luncheon. Immediately after the luncheon was over, a roll-call of all of those present was called by A. L. Matelik (Kirkhill Rubber) and each was asked to name the year in which he started in the rubber industry.

Among those answering the call, with the year indicated in parentheses, were the following: Charles Lamb (1896), George Greene (1894), John Wilson (1912), K. D. Courtois (1916), Don Good (1909), John Hoerger (1914), F. J. Dugan (1917), Ed Royal (1916), C. P. Hall (1917), Bob Abbott (1917), R. B. Stringfield (1920), Carl Minnig (1920), H. R. Thies (1921), Al Brandt (1920), John T. Blake (1924), Walter Geldard (1925), and A. L. Matelik (1924).

Mr. Morath then called upon a few of those present to express opinions as to the continuation of the club and holding of the luncheons at Division meetings. Strong approval was voiced in succession by R. B. Stringfield (Fullerton Mfg.), Frank A. Steele (Goodyear) and Phil Drew (Goodyear). Mr. Drew is the current chairman of the Los Angeles Rubber Group.

The presiding chairman then called upon Charles Lamb, Sr. (Lamb Rubber), who boasts of 52 years of continuous service in the rubber industry, to give a short talk on some of the changes he has witnessed in the industry. This Mr. Lamb proceeded to do under the title of "Heels and Souls," in the form of an informative and humorous talk. Mr. Lamb told of his personal contacts with leaders in the rubber field over the past 50-odd years, including James Lyon Hancock, a direct descendant of Thomas Hancock; Alexander Parkes, the inventor of the cold cure process; John Boyd Dunlop and Charles Palmer, who contributed so greatly to the development of the modern tire; Sir Henry Wickham, credited with the development of the plantation rubber industry. Others mentioned included the Burr family, A. D. Thornton, R. B. Adams and Arthur Marks, all of whom added their contributions. He also referred to Henry Pearson, founder and initial editor of the *India Rubber World*, whose extensive rubber library is now in the possession of the Los Angeles Public Library.

Harry E. Outcault, chairman of the Division, presenting the Charles Goodyear Medal to Dr. David Spence.

Among the points emphasized by Mr. Lamb in his talk, whcih was sprinkled with anecdotes of both the British and American rubber industries, was the fact that over the past fifty years little change has occurred in the basic fundamentals of rubber machinery and equipment. In fact, he said, the old time calenders were somewhat better than their modern counterparts. He also briefly outlined some of the major advances made in rubber chemistry since the early 1900's.

George Greene, whose rubber experience extends slightly farther back than that of Mr. Lamb, was also called upon to reminisce on the industry's developments. He said that Mr. Lamb had covered the story so well there was little he could add, but he did furnish a few anecdotes of his own covering early experiences.

The technical sessions got under way on the afternoon of July 22 with a welcoming address by D. C. "Deke" Maddy (Harwick Standard Chemical), chairman of the local arrangements committee, and a second by R. D. Abbott (C. P. Hall Co.), chairman of the suppliers' cocktail party. The meeting was then officially opened by Harry E. Outcault (St. Joseph Lead), chairman of the Division, and the technical papers were presented.

Members of the 25 year club of the Rubber Division, following the luncheon held during the Los Angeles meeting. (Photographs by A. R. Hromatka).

Presentation of Goodyear Medal

Presentation of the Charles Goodyear Medal and the Goodyear Certificate of Award was made to Dr. David Spence during the technical session on the morning of July 23. The presentation was made by Chairman Outcault.

In making the presentation, Mr. Outcault explained that after the Charles Goodyear Lecture Award was created by the Division in 1940, Dr. Spence was selected to deliver the first Goodyear Lecture. According to the rules in force at the time, Dr. Spence was to have delivered the lecture in the Fall of 1941. Because of ill health, Dr. Spence was unable to present the lecture as scheduled. Mr. Outcault then explained that due to special action on the part of

the Executive Committee of the Division, he was able to award both the Medal and the Certificate of Award at this meeting. The award was originally based on the achievements accomplished by Dr. Spence in the rubber field, particularly in the fields of accelerators and guayule rubber.

In accepting the awards, Dr. Spence, who is now in semi-retirement, residing in Pacific Grove, California, paid special tribute to his numerous colleagues over the past 40 years, and especially to Arthur Hudson Marks, who brought him to the United States from England while head of the old Diamond Rubber Co. He also reviewed some of the early history of rubber chemistry, making mention of the patent litigation which broke the hold in this country of the I. G. Farbenindustrie organization on accelerators.

Brief Business Session Held

A brief business session was also held during the technical session on the morning of July 23. No special reports were made, but Mr. Outcault announced that according to the last report of the Membership Committee as of May 31, since the functioning of the committee under James Richards (Goodrich Chemical) 184 regular members had been added to the Division's roster and 47 associate members. Some 40 A. C. S. members were also secured.

Mr. Outcault reminded the members that attendance that the Fall Meeting of the Division will be held at the Book-Cadillac Hotel in Detroit, Mich., on November 8, 9 and 10, and the Spring, 1949, Meeting in Boston. The Fall, 1949, Meeting will be held in Atlantic City, N. J., in conjunction with the parent society.

The Chairman also referred to the work of the special committee appointed to define "sponsorship" by the Division of the local rubber groups and said that a report on such definition will probably be given by the committee at the Detroit meeting. He reminded his audience that the rubber library established at the University of Akron by the Division was intended to function for the benefit of the entire membership and urged that they take advantage of it. He also announced that official approval for publishing the proposed monograph on synthetic rubber had been received from the Monograph Committee of the American Chemical Society.

In concluding the business session, Mr. Outcault paid tribute to the active Executive Committee with which he has been working. Due to a slip-up, he said, nominees for the 1948-49 period had not been presented to the membership at the Spring Meeting of the Division, but the names of such nominees will shortly be published in the rubber journals. He stressed the point that any member may be put forth for office upon presentation of a petition bearing at least twenty-five signatures.

Banquet Attracts Over 200

The Division banquet, which was held in the ballroom of the Biltmore Hotel, one of Los Angeles' largest hotels, on the evening of July 22, attracted approximately 220 members and guests. In addition to a good dinner, it featured an entertainment program consisting of a number of unusual novelty acts, including a barber shop quartet with community singing.

Some of the members and guests who attended the division meeting included, left to right, Carl Minnig (Continental Carbon), Al Brandt (Goodrich Chemical), R. B. Stringfield (Fullerton Mfg.), H. R. Thies (Goodyear), C. P. Hall (C. P. Hall), Walter Geldard (Naugutuck Chemical), and Bill Reardon (Monsanto).

In opening the banquet, Chairman Outcault first introduced all those seated on the dais, these including a number of leading rubber executives from the Los Angeles area and the members of the various local committees which handled the innumerable details surrounding a Division meeting. No speeches of any kind were made. The Suppliers' Cooperative Cocktail Party preceded the banquet, made possible by generous contributions from some 75 supply organizations.

All of the details in connection with this initial meeting of the Rubber Division on the West Coast were capably handled by those in charge. D. C. Maddy (Harwick Standard Chemical) was chairman of the Local Arrangements Committee, and did an outstanding job. Those in charge of various functions included the following: *Registration,* Ralph T. Hickcox (Goodyear); *Publicity,* E. C. McLaughlin (H. M. Royal); *Housing,* R. E. Bitter (Goodrich Chemical); *Information,* George W. Miller (Voit Rubber); *Banquet,* C. H. Churchill (Sterling Rubber Products); *25 Year Club Luncheon,* J. R. Morath (Naugatuck Chemical); *Suppliers' Cocktail Party,* R. D. Abbott (C. P. Hall Co.). Phil Drew (Goodyear) acted as *pro tem* secretary for the meeting in the absence of Charles R. Haynes (Binney & Smith), the regular secretary.

Fineberg Appointed At Glyco

Glyco Products Co., Inc., Brooklyn, N. Y., and Natrium, W. Va., has appointed Dr. Herbert Fineberg as chief chemist. Dr. Fineberg is a graduate of the University of Illinois where he has done extensive work on butadiene polymers and copolymers. He was previously associated with the Eastman Kodak Co., where he worked on plasticizers, plastics and textile lubricants. At the Connecticut Hard Rubber Co. he developed a series of synthetic organic products and at the General Chemical Co. he produced a new unique plasticizer. Dr. Fineberg has also served as a consultant on special chemical engineering problems.

The average passenger car today is about 9 years old, compared to 5½ years in 1941, according to James J. Newman, vice-president of the B. F. Goodrich Co. Also, nowadays the average auto is operated 14½ years before being scrapped. Before the war the average age at which they hit the junkpile was 10½ years.

General Latex Elects Officers

The following officers of the General Latex & Chemical Corp. were recently elected: *President,* Kenneth B. Osborn; *Vice-President in Charge of Production,* Chester A. Brown; *Vice-President in Charge of Laboratories,* Henry B. Townsend; *Treasurer,* Warren MacPherson; *Assistant Treasurer and Clerk,* Frederick L. Patton. Mr. Osborn was formerly vice-president and succeeds the late Harvey J. Elwell. At the same time the following directors were elected: *Chairman,* Arthur B. Newhall; and Chester A. Brown, Lawrence Clayton, Warren MacPherson, K. B. Osborn, and W. Craig Steele.

The Chemical Division of Koppers Co., Inc., Pittsburgh 19, Pa., has issued a 24-page booklet, bulletin No. C-8-110, describing the properties, uses, and reactions of diamyl phenol.

Plants and offices of the Mansfield Tire & Rubber Co. closed for a two week vacation period, with personnel returning to duty in early August.

BRAZILIAN RUBBER PRODUCTION SHOWS INCREASE DURING APRIL

According to figures covering rubber purchases made by the Rubber Credit Bank published in *Foreign Commerce Weekly*, publication of the Department of Commerce, Brazilian production of natural rubber during April, 1948 totaled 3,807,392 net kilograms, as compared with 1,503,605 kilograms in the preceding month and 2,884,228 kilograms reported for April, 1947. (1 kilogram=2.2046 pounds.)

Approximately 98.7 percent came from the Amazon Valley and the remainder came from other producing areas of Brazil. The increase of about 60.5 percent over March, 1948 and 24.4 percent over April, 1947 may be attributed to the fact that the Rubber Credit Bank took over payment of rubber delivered to it by producers since the beginning of 1948.

Shipments of natural rubber from all of the producing areas to southern Brazil during April, 1948 totaled 668,517 net kilograms, as compared with 2,698,175 kilograms exported during the preceding month, and 2,624,638 kilograms shipped during April, 1947. The substantial decrease in shipments during April, 1948 may be explained by the accumulation of stocks of natural rubber in southern consuming centers of Brazil, and the lack of foreign markets.

The foreign demand is inactive because the cost of Brazilian rubber is substantially higher than the international market price. Stocks of natural rubber held by the Rubber Credit Bank at the end of April, 1948 amounted to 9,599,268 net kilograms at exporting points, and 3,696,166 kilograms at consuming points in Brazil.

Trade estimates obtained by the Consulate General of Sao Paulo indicate that the production of reclaimed rubber during the first quarter of 1948 was approximately 300,000 net kilograms. Practically all reclaimed rubber is produced and used by manufacturers of rubber products in their own operations.

Placo Rubber In ERP Estimates

According to Dun & Bradstreet, Inc., New York City, out of the $1,344,000,000 worth of American and other Western Hemisphere products to be shipped abroad in the first year of the European Recovery Program, some $2,100,000 in rubber goods will be included. Based on U. S. State Department, and ERP estimates, 54% of the over-all sum will be spent on U. S. products, while 36% will be for purchases from other countries in the Western Hemisphere.

Navy Honors Rubber Companies

In recent ceremonies in New York City, the Department of the Navy awarded certificates of achievement to thirty-nine companies including the Seamless Rubber Co., New Haven, Conn., and S. S. White Dental Manufacturing Co., Philadelphia, Penna., for services rendered to the Medical Department of the Navy during the recent war.

Coming Events

Aug. 14. Washington Rubber Group, Outing, Great Falls, Va.
Aug. 15. Northern California Rubber Group, Outing, Curry Creek Park, Oakland, Calif.
Aug. 24. New York Rubber Group. Golf Tournament, Winged Foot Golf Club, Mamaroneck, N. Y.
Sept. 10. Detroit Rubber & Plastics Group, Detroit-Leland Hotel, Detroit, Mich. (Tentative).
Sept. 17. Philadelphia Rubber Group, Outing, Oak Terrace Country Club, Ambler, Penna.
Sept. 17. Southern Ohio Rubber Group. Dayton, Ohio. (Tentative).
Sept. 21. Buffalo Rubber Group, Westbrook Hotel, Buffalo, N. Y.
Sept. 24. Boston Rubber Group, Somerset Hotel, Boston.
Sept. 24. Chicago Rubber Group, Morrison Hotel, Chicago.
Sept. 30. Northern California Rubber Group.
Oct. 1. Detroit Rubber Group. (Tentative).
Oct. 5. Los Angeles Rubber Group, Mayfair Hotel, Los Angeles, Cal.
Oct. 15. Akron Rubber Group, Mayflower Hotel, Akron.
Oct. 15. New York Rubber Group, New York, N. Y.
Oct. 19. Buffalo Rubber Group, Westbrook Hotel, Buffalo, N. Y.
Oct. 28. Northern California Rubber Group.
Nov. 8-10. Rubber Division, A.C.S., Fall Meeting, Book-Cadillac Hotel, Detroit, Mich.
Nov. 18. R. I. Rubber Club, Crown Hotel, Providence, R. I.
Nov. 18. Northern California Rubber Group.
Dec. 7. Los Angeles Rubber Group. Xmas Party.
Dec. 9. Southern Ohio Rubber Group, Xmas Party, Miami Valley Country Club, Dayton, Ohio.
Dec. 10. New York Rubber Group, Xmas Party, New York, N. Y.
Dec. 10. Detroit Rubber & Plastics Group, Xmas Party, Detroit-Leland Hotel, Detroit, Mich.
Dec. 14. Buffalo Rubber Group, Xmas Party, Westbrook Hotel, Buffalo, N. Y.
Dec. 17. Boston Rubber Group, Somerset Hotel, Boston.

Pharis Plant Still Closed

At this writing, the Pharis Tire & Rubber Co., Newark, Ohio, which has been inoperative since May 1, due to a dispute with the URW, CIO, was still closed. At a New York meeting on July 15, the board of directors voted to liquidate the plant if the union and the company could not agree on a revised wage scale. A scheduled meeting of the board in New York on July 29 was postponed due to illness of one board member and the absence of another.

The Plant Rubber and Asbestos Works, San Francisco, for many years a corporation wholly-owned by the Paraffine Cos., Inc., officially became the insulation division of Paraffine recently.

PRODUCTION OF NATURAL RUBBER RISES IN FIRST HALF OF 1948

Production of crude natural rubber in the nine states of the Malayan Union, chief post-war Far East producing area, amounted to 347,685 long tons in the first half of this year, recording a small increase of 13,415 long tons, or 4% from the 334,270 long tons produced in the last half of 1947, Commodity Exchange, Inc., reported recently.

Malayan Union exports in the first half of 1948 totaled 359,520 long tons, a slight decrease of 6,042 long tons from 365,562 long tons shipped in the second half of last year. Of the Malayan Union shipments, 94,936 long tons moved directly to the United States against 117,145 long tons in the second half of 1947, a decline of 22,209 long tons, or 19%.

Stocks of crude rubber, both wet and dry combined, in all hands in Malaya at the end of June amounted to 140,747 long tons, practically unchanged from stocks at hand at the end of May. Of the stocks on hand, 81,581 long tons were in the Malayan Union, and 59,166 long tons at the port city of Singapore.

Chile Rations Inner Tubes

By an official decree effective May 31, 1948, the Chilean Government reestablished rationing of domestic and imported inner tubes of all sizes. The measure is intended to insure an equitable distribution of inner tubes available in the market, according to trade opinion, and was prompted by a downward curve in the production trend of the domestic tube-manufacturing industry. Importing and distributing concerns are required to report their stocks to the Office of Transportation Materials. Special authorization must be obtained for the transportation of inner tubes from one section of the country to another.

Rubber Companies Receive Award

Several rubber companies, including the Goodyear Tire & Rubber Co., the General Tire & Rubber Co., the B. F. Goodrich Co., and the Seiberling Rubber Co., all of Akron, Ohio, have been awarded certificates of merit by the *Financial World*, New York financial weekly, for excellence of their annual reports to stockholders. Two thousand reports were judged by the publication in the annual contest which covered the year of 1947.

Westvaco and Food Machinery Merge

Westvaco Chemical Corp., New York, and the Food Machinery Corp. have reached an agreement for merger of the two companies. The name of the new organization will be the Food Machinery and Chemical Corp. The business of Westvaco will be operated under the direction of its present managment as the Westvaco Chemical Division of the parent company. The merger agreement is in the process of ratification by stockholders.

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◆

HMF (High Modulus Furnace)
STATEX-93

◆

FF (Fine Furnace)
STATEX-B

◆

VFF (Very Fine Furnace)
STATEX-K

◆

FEF (Fast Extruding Furnace)
STATEX-M

◆

SRF (Semi-Reinforcing Furnace)
FURNEX

◆

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DISTRIBUTOR

ARCHIE KEMP RETIRES AUGUST 1 AFTER THIRTY YEARS WITH BELL

Archie R. Kemp, who, for a number of years, has been in charge of research and development on rubber, plastics, organic chemicals, and electrical insulating materials at the Bell Telephone Laboratories, Inc., Murray Hill, N. J., retired on August 1, after thirty years service with the company. Mr. Kemp plans to return to Southern California where he will continue to keep in touch with rubber developments. He also will spend some time, every year, on his farm properties in South Dakota.

Mr. Kemp was born in Groton, South Dakota on April 24, 1894. Educated at the California Institute of Technology, Mr. Kemp received the first B.S. degree in chemistry given by that institution. He received his Master's Degree in 1918, after which he joined the Western Electric Engineering Department in New York City, now the Bell Telephone Laboratories.

During his almost thirty years service with the company, Mr. Kemp spent twelve years in active research on submarine cable insulation problems. During 1929 and 1930, Mr. Kemp went to Europe to introduce this insulation into European factories. He was resident engineer at the Hawthorne works, factory of Western Electric Co., and supervised the manufacture of the San Pedro, Calif., Catalina Island submarine cables, in 1923. He was responsible for the development of the pressure equalizer material used on the first and succeeding high speed Permalloy loaded telegraph cables, the first of which was laid by Western Union between New York and the Azores in 1924.

Active in Process Development

Mr. Kemp has been active in the development of processes for the continuous vulcanization of rubber insulation on wire, and was responsible for the introduction of synthetic rubber into the Bell System and for military use on wires replacing natural rubber. He has published 48 articles on numerous subjects concerning rubber, insulating materials, submarine cables, etc. He also holds more than 40 U. S. patents.

Mr. Kemp is a member of a great many professional and technical societies. In 1933, Mr. Kemp served as chairman of the New York Rubber Group, and in 1938 was made a fellow in the Institution of the Rubber Industry in Great Britain. The Chicago Section, ACS, designated Mr. Kemp among the 10 ablest rubber chemists now working in the United States, in 1947. He is also a member of ASTM, and the American Association for the Advancement of Science, as well as the New York Academy of Science.

As a member of the Foundation for the Study of Cycles, Mr. Kemp recently contributed an article on "Periodic Droughts in South Dakota," the results of five years of special research. He is interested in many outside activities, which include hunting, fishing and riding.

Archie R. Kemp
who has retired after thirty years with Bell Telephone

Aluminum Flake Sales Agents

The Aluminum Flake Co., Akron, Ohio, have announced the appointment of Rice & Co., 23970 Effingham, Euclid, Ohio, as their representative for the sale of Aluminum Flake in Ohio. This product, hydrated aluminum silicate, has been used as a rubber reinforcing agent for the past fifty years. In the New England states, Berlow & Schlosser Co., Providence, R. I., maintain a warehouse stock of the product, and are representatives in this section. Canadian representative for the company is the Standard Chemical Co., Ltd., Toronto. Warehouse stocks in Canada are carried in both Toronto and Montreal.

Tuf-Lite Plastic Material

Goodyear Tire & Rubber Co. has released advance information about its new plastic rubber material, "Tuf-Lite". Scheduled to be introduced to the trade at a special showing in September, the material offers a wide scope of industrial uses. Among the advantages claimed for the material is its toughness, high-impact resistance, low water absorption, good tensile strength, and excellent electrical properties. Readily machinable, Tuf-Lite can be polished by buffing, and in the opinion of Goodyear officials, is one of the toughest high-hardness plastic rubbers developed to date.

Hold 22nd Colloid Symposium

The Twenty-second National Colloid Symposium was held at the Massachusetts Institute of Technology, Cambridge, Mass., from June 23 to 25 under the auspices of the Colloid Division of the American Chemical Society. Among the numerous papers given was one by Dr. Paul J. Flory and T. G. Fox, Jr., of the Goodyear Tire & Rubber Co., Akron, on the dependence of the physical properties of rubber, fibers and plastics upon the weight of their molecules. A report on "Antibiotic Colloids" was given by Dr. Ernst A. Hauser.

RUBBER CONSUMPTION IN JUNE REACHES NEW HIGH FOR YEAR

Consumption of both natural and synthetic rubber by American industry in June was at the highest monthly level since last January, according to a report recently issued by Commodity Exchange, Inc., New York. Natural rubber consumption in June amounted to 55,692 long tons, against 55,022 long tons in May. Consumption of synthetic in June amounted to 39,318 long tons, compared with 35,268 long tons in May.

In addition to natural and synthetic rubbers, the industry consumed 23,527 long tons of reclaimed rubber in June. Overall consumption of rubber in June amounted to 118,537 long tons, compared with 109,265 long tons consumed in May. Total natural rubber consumption for the first half of this year amounted to 352,763 long tons, against 368,604 long tons in the first half of 1947.

Importation of natural and domestic production of synthetic during June were also at a high level, outrunning consumption, and stocks on hand, which are available to industry, showed a moderate gain at the end of the month. Natural imports in June amounted to 64,055 long tons, against 40,709 long tons in May. Stocks on hand in this country, available to industry, but exclusive of government stockpile, rose to 118,389 long tons at the month's end from 112,724 long tons at the end of May.

Appointed District Manager

The American Zinc Sales Co., St. Louis, Mo., has announced the appointment of George R. Throop, Jr., as Chicago District Manager. Mr. Throop assumed his duties on August 1, with offices in the Chicago Temple Building, 77 W. Washington Ave., Chicago, Ill. Mr. Throop has been connected with the American Zinc Co. since 1940. He is a graduate of Washington University of St. Louis, and during World War II he served on active duty as a Lieutenant in the Navy. Prior to his appointment to the Chicago office, Mr. Throop was located in company offices in St. Louis.

Elastomer Chemical Formed

The Elastomer Section of Electro-Technical Products Division of the Sun Chemical Corp., will henceforth be known as the Elastomer Chemical Corp. with main offices at 113 East Centre St., Nutley 10, N. J., and a branch office at 101 Park Avenue, New York. The new company will operate independently of Sun Chemical, according to the announcement.

Firestone Repurchases Plant

Firestone Tire & Rubber Co. has bought back from the Government 4.34 acres and a building near Wilbeth Road in Akron, Ohio, which will be used for research and development. The chemical pilot plant will be ready for use in a few weeks, company spokesmen said. Purchase price of the plant was estimated at $37,500.

CHICAGO RUBBER GROUP HOLDS SUMMER OUTING AND TOURNAMENT

The Chicago Rubber Group concluded its 1948 season with the largest golf outing in its history on July 17 at the Acacia Country Club, La Grange, Ill., with approximately 225 members and guests in attendance. Maurice O'Connor (C. P. Hall) was chairman of the outing committee which included Ed Meyer, Charles Skuza and Dwight Smith, all of the Inland Rubber Co., and John Gallagher (Allis Rubber), and Bob Campbell (N. J. Zinc).

One hundred and sixty members participated in the golf tournament. Winners of prizes were: *Low Gross,* Jim Adams (Sears-Roebuck), Don Zimmerman (U. S. Rubber), Joe Smith (Brunswick-Balke-Collender), A. E. Barkett (Goodrich), L. B. Wagner (Metropolitan Golf Ball) and J. Clifford; *Blind Bogey,* F. E. Witherell (Enjay), W. J. Bieberle (American Viscose), Jack Leeds (Leeds Rubber), and Charles Skuza and B. Benson (Inland Rubber).

Low Net, Chuck Oshinski (U. S. Rubber), Ed Meyer (Herron & Meyer), M. Weintraub (Muehlstein), M. Neery and C. O. McNeer; *Low Putt,* Bruce Hubbard (Ideal Roller), and A. E. Barkett; *Honesty Award,* Art Krause (Marbon); *Most Balls in Water,* G. G. Kraft (Kraft Chemical).

After the golfing tournament a dinner was served at which prizes were distributed. Various members at the outing received gifts which included white wall tire sets, picnic sets, radios, clocks, matched woods, Mixmasters, electric irons, Shavemasters, game sets, and more. Cal Yoran (Brown Rubber) won the matched luggage door prize during the evening festivities.

New York Golf Tournament Set

The annual golf tournament of the New York Rubber Group will be held on August 24, at the Winged Foot Club, Mamaroneck, N. Y. The outing committee has arranged for a luncheon and a dinner, and a full day of golfing activities including special events and contests. Prizes will be awarded to the winners of the different games. The outing committee includes: *Chairman,* C. R. Haynes (Binney & Smith), and J. H. Nesbit (U. S. Rubber Reclaiming), E. B. Curtis (R. T. Vanderbilt), Charles T. Jansen (Rubber Age), B. B. Wilson (India Rubber World), A. H. Eufer (R. T. Vanderbilt), T. T. MacConnell (U. S. Rubber Reclaiming).

Smith Opens New York Office

Clarence S. Smith, for the past 28 years associated with the Acme Rubber Manufacturing Co., Trenton, N. J., in the sales and purchasing departments, has opened his own office at 321 Broadway, New York City. Mr. Smith arranges purchases and sales of surplus items such as cotton fabrics, yarns, chemicals, oils, wire, baling materials and manufactured rubber products.

Southern Ohio Officers

Officers of the Southern Ohio Rubber Group and several of the committee members who handled the recent outing of the group, held at Edelweiss Park in Dayton

on May 15, appear in the above photograph. From left to right these men are: R. J. Hoskin, secretary; Robert A. Emmett and Herbert S. Karsh, outing committee; Robert S. Radow, chairman; Harold H. Wolfe, treasurer, and Raymond K. Ritzert, outing chairman. The photograph was taken by Herman Wening.

Chicago Plans 1948-49 Season

The first meeting of the 1948-49 season of the Chicago Rubber Group will be held on September 24, at the Morrison Hotel in Chicago, Ill. Speakers for the meeting will include L. R. Sperberg (Phillips), who will address the group on "Low Temperature Synthetic Rubber", and George E. Popp (Phillips), who will speak on "Compounding with HAF Type Blacks in Natural and GR-S Rubbers". Another talk will be given on rubber equipment, for which a speaker has not yet been announced. Other scheduled meetings will be held on December 17, 1948, February 4, March 25, May 20, and a summer outing in July, 1949.

Personnel Changes at Goodrich

George J. Fischer, formerly product manager of the Industrial Products Sales division of the B. F. Goodrich Co., has been named manager of national accounts of the division. Mr. Fischer was succeeded by James M. Flounders who was previously engaged in technical development in hose sales. Mr. Fischer is a graduate of Heidelberg University and joined Goodrich in 1934. He has served in the Industrial Products division for eight years, two of which he spent as division operating manager. Mr. Flounders is a graduate of the University of Delaware and joined the company in 1939 as a construction engineer.

Changes At Industrial Tape

Industrial Tape Corp., New Brunswick, N. J., has announced that H. M. Sonnichsen, formerly technical service manager, has been appointed assistant director of laboratories. W. J. Klug, Jr., has been made technical service manager succeeding Mr. Sonnichsen. R. E. Norland has been placed in charge of the development division, and J. A. McGarry, formerly in charge of development, has been made special assistant to the director of laboratories.

ATHLETIC EVENTS FEATURED AT BUFFALO GROUP OUTING

Golf and baseball tournaments featured the annual summer outing of the Buffalo Rubber Group held on July 31, at the Lancaster Country Club, Buffalo, N. Y. Members of the Ontario Rubber Group joined the Buffalo Group for the outing and succeeded in winning several of the prizes awarded at the different events. Contest winners of the golf tournament were: *Low score,* J. W. Ansley (Seiberling - Canada); *High Score,* H. Knectal (Hewitt-Robins); *Most Pars,* A. L. Wraight (Dunlop-Canada); *Most 4's* Roy Tipton (Seiberling-Canada); *Most 7's,* H. J. Tenoy (Pierce & Stevens); *Most Strokes on One Hole,* Paul Tufts (Barrett Co.) and R. Emmett (Binney & Smith).

Nail Driving, was won by Roy Tipton. *Pail Contest,* was won by William King (Seiberling-Canada). *Tug-of-War,* was won by a team captained by H. Evans (Enjay). *Darts,* A. L. Davis (Dunlop) was the winner. *Baseball,* was won by a team captained by H. Karch (C. P. Hall). A drawing was held at the group dinner, and prizes were awarded to many of the members and guests who were present.

Cabot Buys Black Plant

Godfrey L. Cabot, Inc., Boston, Mass., has purchased the government-owned carbon black plant at Monument, Texas, for $773,500, according to a recent announcement by the War Assets Administration. The plant, which has an annual capacity of 15,200,000 pounds of carbon black, was constructed for wartime production by the government at a cost of $2,250,000. Operated under an interim lease by the Charles Eneu Johnson Co., of Philadelphia, Penna., the plant is the last of six surplus big-capacity, channel-type carbon plants built by the government.

Connecticut Elects Officers

In a recent election the Connecticut Rubber Group selected the following officers for the coming year: *Chairman,* Stuart M. Boyd (U. S. Rubber-Naugatuck); *Vice-chairman,* Donald Spengler (Sponge Rubber Products); *Treasurer,* George Sprague (Sponge Rubber Products); *Secretary,* Carl Larson (Whitney Blake). Directors of the group are: Hugh Allison (Allison Co.); George T. Vaala (Du Pont-Fairfield). Officers and directors will take over their new positions at the regular fall meeting of the group.

Peruvian Medal For Litchfield

In recognition of his contribution to the economic welfare of Peru, through the establishment five years ago of a tire factory in Lima, Peru, P. W. Litchfield, chairman of the Goodyear Tire & Rubber Co., and president of its Peruvian subsidiary, was recently awarded the Order of the Sun, with grade of Knight Commander, by General Armando Reveredo, Peru's minister of foreign affairs, at ceremonies in Lima.

Firestone Plastics Co. Moves

Firestone Plastics Co., formerly located in Akron, Ohio, has been moved to a new plant and offices at Pottstown, Penna., where all plastic activity, including sales, will be integrated. Development and production of plastic materials have been located there, together with one of Firestone's largest tire production units.

All production activities at Pottstown will be under the direction of Dr. E. T. Handley, formerly in charge of foreign plant manufacturing activities, and wartime head of the company's synthetic rubber program. J. C. Blue, formerly factory manager at Pottstown, has become factory manager of the company plant at Des Moines, Iowa. Ward B. Early will continue in charge of tire manufacturing at Pottstown, and Henry Koehler will head plastics production. Frank J. Groten continues as director of the plastic development laboratories. Harold W. Hooper, formerly Comptroller at Firestone Aircraft Co., has been appointed Comptroller at Pottstown. Elmer H. French, general sales manager of the plastics company, has also moved from Akron to Pottstown.

Other members of the sales staff who have headquarters in Pottstown are: Kenneth L. Edgar, manager of Velon film sales; E. A. Ryder, manager of Velon flex sales; Erle M. Brizard, manager of Velon filament sales, and M. D. Price, manager of Velon screening sales.

Patent Abstracts Available

Of interest to the rubber industry is a compilation of abstracts of 358 United States patents formerly owned by nationals of enemy countries and seized by the Department of Justice, Office of Alien Property, since November, 1945. The abstracts are now on sale by the Office of Technical Services, Department of Commerce. Most of the patents are available for licensing to American firms by the Office of Alien Property on a royalty free, non-exclusive basis for the remaining life of the patents. Copies of the compilation, Report PB-88841, *List of Vested Patents Available from Office of Alien Property,* sell for $4.00. Orders should be addressed to O.T.S., Department of Commerce, Washington 25, D. C. A leaflet called *Index and Guide to Enemy Patents vested in the Attorney General as of January 1947,* which contains general information about the availability of enemy patents, is available free of charge from either O.T.S. or the Alien Property Custodian.

California Tire Dealers Meet

The second meeting of the San Francisco Chapter of the California State Tire Dealers Association took place last month at San Francisco's PG&E Auditorium. Principal speaker of the evening was Sam Barnblatt, who outlined the many varied and useful functions of the National Association of Independent Tire Dealers. Mr. Barnblatt also outlined the beneficial reasons for the formulation of state and local chapters within the national tire dealer program.

Hewitt-Robins House Organ

Hewitt-Robins, Inc., have renewed the publication of the company house organ *Topics,* with the July issue. Previously published once every two months, the publication will now be issued on a monthly basis and mailed to each employee's home instead of being distributed at the plant gate as was previously done. The handsome four page publication is printed on "slick" paper, and is illustrated with photographs and cartoons. President Thomas Robins, Jr., in announcing the new *Topics,* said the publication was being put on a monthly basis because many employees indicated they would prefer to get company news more frequently.

Reduces Mold Lubricants Prices

Dow Corning Corp., Midland, Mich., has reduced prices on silicone mold lubricants for rubber and plastics produced by the company from 5 to 9%. Products falling within the price reduction include DC Mold Release Fluid, which has been reduced as much as 9% in drum quantities, and DC Mold Release Emulsion Fluid No. 35, which has been reduced about 5%. Although Emulsion No. 35 has been available only two years, this latest price reduction is the third for a total of 18% in the two year period, company officials pointed out. Price savings were generally attributed to production economies.

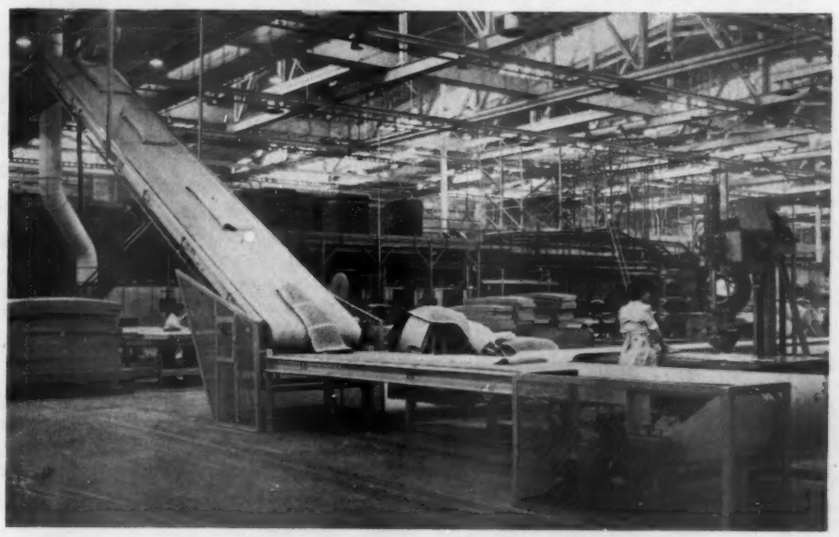
Stanton To Open Texas Unit

Stanton Chemicals, Inc., is now constructing a plant at Corpus Christi, Texas, for the production of products from petroleum hydrocarbons including aromatic type hydrocarbon compounds and their derivatives such as benzene, toluene, xylene, naphthalene, anthracene, anthroquinone and phthalic anhydride. An extensive list of halogenated, nitrated, and oxidized hydrocarbon compounds also is contemplated for manufacture at the plant which is scheduled to begin operations in the late fall of this year. The plant installation will have a nominal capacity of 50 tons of finished products daily, and provisions have been made to increase the production figure to approximately 200 tons within the first year of operation. The organization is headed by Robert E. Stanton, consulting engineer of Denver, Colo., who was active, for many years, in the production of synthetic rubber and organic chemicals.

Increases Wire Cable Prices

The U. S. Rubber Co. has increased the prices of its electrical wire and cable from 6 to 13%. Copper building wire was increased 13%; aluminum building wire with braided cover 7%; aluminum building wire with neoprene cover 13%, and portable cords 6%. Price rises were attributed to the rising costs of labor and materials.

GOODYEAR'S CONTINUOUS PRODUCTION LINE FOR FOAMED RUBBER



The photograph above depicts conveyor belts carrying cured Airfoam through drying units and then high across the new plant of the Goodyear Tire & Rubber Co.

What is said to be the world's largest continuous production line for foamed rubber has been placed in operation by the Goodyear Tire & Rubber Co. at a new plant in Akron, Ohio. Turning out Airfoam cushioning for automotive seating and for the furniture and mattress industries, the new production line occupies facilities used during the war by a subsidiary, Goodyear Aircraft Corp., in the production of Army airplane parts.

Representing an outlay of more than $5,000,000 in buildings and equipment, the operation is embraced in three parallel units. Two of the units are in production exclusively for automotive seating, while the third is producing mattresses, mattress topper pads, molded Airfoam for furniture cushions, backs and arm rests, and other items.

NAMES IN THE NEWS

L. M. RISHELL, sales manager of the Servus Rubber Co., has been elected to the Board of Directors of the company, succeeding JOHN G. HUNTOON.

EVAN E. GRAHAM, sales engineer of Durez Plastics & Chemicals, Inc., has established a company West Coast office at 3628 E. Olympic Blvd., Los Angeles 23, Calif., to handle sales of phenolic molding compounds.

DR. HENRY F. PALMER, consulting rubber technologist of Akron, Ohio, is the author of an article on "Reclaimed Rubber" which was published in the June, 1948, issue of *The Flame*, house organ of Godfrey L. Cabot Co., for its plant and office employees in Texas, West Virginia, Florida and Massachusetts.

GEORGE PRETTY, an official and one of the organizers of the Pretty-Scheffer Rubber Co. at Coshocton, Ohio, plans to retire and with Mrs. Pretty will move to East Liverpool, Ohio, where they are constructing a new home.

WILLIAM P. MARSH, JR., formerly executive vice-president of U. S. Industrial Chemicals, Inc., has been elected president of the company, succeeding GLENN L. HASKELL, who has become vice-chairman of the board of directors.

KARL E. BALLIET, formerly with the Passaic, N. J., plant of the U. S. Rubber Co., has joined the Rubatex Division of Great American Industries, Inc., at Bedford, Va.

PAUL J. FLORY, currently in charge of fundamental research at the Goodyear Research Laboratory in Akron, has accepted appointment as professor of chemistry at Cornell University, effective in September.

EARLE C. MAKIN, JR., formerly with the Copolymer Corporation as laboratory manager, is now a group leader in the recently organized research division of the Lion Oil Co. at El Dorado, Arkansas.

D. S. HARDER, vice-president and director of manufacturing of the Ford Motor Co., has been appointed director of purchasing of that company, succeeding ALBERT J. BROWNING, who died recently.

ROBERT E. WORKMAN, chemical engineer for the Goodyear Tire & Rubber Co., has been named a special representative of the company's newly-created Chemicals Division, and will be stationed in St. Louis, Mo.

DWIGHT B. ELDRED, formerly central division manager of the U. S. Tires Division of U. S. Rubber Co., has been appointed assistant sales manager of the division, with headquarters in New York.

WALTER FREDERICK, assistant treasurer of the Pioneer Rubber Co., has been elected a member of the company's board of directors succeeding J. C. GIBSON who died recently.

F. S. "STAN" RIGGS, rim plant employee of the Goodyear Tire & Rubber Co., was recently presented with a 35-year pin, at a special ceremony at the company.

DR. WILLIAM I. MYERS, dean of the New York State College of Agriculture at Cornell University, and acting chairman of the Federal Reserve Bank of New York, has been elected a director of U. S. Industrial Chemicals, Inc.

CHARLES A. MCCLOSKEY, associated with the Pennsylvania Salt Manufacturing Co., has been named district manager of the newly consolidated New York and Paterson, N. J., offices.

FRANK J. SMITH, formerly associated with the Owens-Corning Fiberglas Corp., has been named advertising and sales promotion manager of Philip Carey Mfg. Co., of Lockwood, Ohio, suppliers of magnesia and other products.

VAL W. DETLING, formerly associated with the Firestone Tire & Rubber Co., has joined the sales staff of the new Huntington Div. of the Voit Rubber Co.

P. S. SCHOAFF has been appointed plant manager at the Los Angeles, Calif., plant of the Goodyear Synthetic Rubber Corp. succeeding G. A. BOELTER who resigned to become vice-president of the Standard Perlite Corp.

CHESTER A. BROWN, plant manager of the General Latex & Chemical Corp., has been elected a vice-president and member of the board. HENRY B. TOWNSEND, chief chemist, has also been elected a vice-president.

LESTER B. GILLIE, assistant director of industrial sales in the plastics department of E. I. du Pont de Nemours & Co., Inc., has been appointed director of industrial sales succeeding WILLIAM A. JOSLYN, who has retired.

FREDERICK L. GRAHAM has been appointed representative in Paris for the sale of carbon black and pine distillates in France for Godfrey L. Cabot, Inc.

HENRI F. LOGCHER, formerly sales manager at Home Products International, Ltd., has been appointed export manager for Magnus, Mabee and Reynard, Inc.

ALBERT W. FUHRMAN has been appointed a research chemist in the Chemical Division's laboratories of the Glenn L. Martin Co., Baltimore.

HENRY B. CLARK, associated with the Diamond Alkali Co. since 1934, and former head of the Boston, Mass., office of the company, has been appointed manager of the New York sales office succeeding CHARLES V. DOUGLAS, who recently resigned. CHARLES L. FLACCUS, JR., who has been associated with the company since 1933, has been named assistant branch manager at New York.

KENNETH L. WEEDEN, associated with the Goodyear Tire & Rubber Co. for five years, has been appointed to the staff of the Builder's Supply and Flooring Department of the company, with headquarters in Akron, Ohio.

R. H. MATHER, long associated with foreign production operations of the Firestone Tire & Rubber Co., has been placed in charge of all overseas plant production, succeeding E. T. HANDLEY, who was transferred to Pottstown, Penna., where he will be factory manager in charge of all production.

CARL W. VIRGIN, chief research chemist of the Vulcanized Rubber & Plastics Co., Morrisville, Penna., has been elected chairman of the Trenton, N. J., section of ACS.

R. M. STEVENSON, a director of Givaudan-Delawanna, Inc., New York City, has assumed the duties of mid-western sales manager with headquarters in Detroit, Mich. J. H. R. STEPHENSON has been appointed eastern sales manager as of October 1.

EDWARD T. MARSHALL has resigned as manager of the butyl rubber, butadiene and styrene sections of the Office of Rubber Reserve, Reconstruction Finance Corp., and has rejoined the Standard Oil Development Co., Elizabeth, N. J., as a member of its development division.

CARL E. HILLERS, who joined the G. S. Ziegler Co., manufacturers of asphalt and pitch products, New York City, a year ago as consultant, has been appointed technical director of the company.

HOWARD C. JOSEPHSON, formerly sales manager of Greene, Tweed & Co., North Wales, Penna., has retired from that position to devote himself to his interests in the newly formed Howard Asbestos Co., Northfield, Vt.

ROBERT R. KIDD, associated with the Goodyear Tire & Rubber Co. since 1943, has been appointed chief chemist of the company's plant in Buitenzorg, Java.

CHARLES H. CALDWELL, associated with the sales promotion departments of the B. F. Goodrich Co. since 1944, has been appointed sundries sales promotion manager.

GEORGE P. HOOPER, SR., former automobile production executive, has been appointed to the newly created position of Manager of Automotive Restfoam Sales for Hewitt-Robins, Inc.

Snyder Named Technical Director

John W. Snyder

John W. Snyder, associated with Binney & Smith Co., New York City, since 1927, has been appointed technical director of the company, succeeding Donald F. Cranor, who died recently. Mr. Snyder was born in New Jersey, and received his chemical training at Cornell University where he graduated in 1927 with the degree of Bachelor of Chemistry. Upon his graduation, Mr. Snyder joined the Research and Development Department of the company, working on the chemical and physical properties of carbon blacks and how these properties affected the usage in different industries. Mr. Snyder is the co-author of many technical articles, among them "Rubber Vulcanizing Properties of Colloidal Carbons", which appeared in the *Proceedings of the Rubber Technology Conference, London, 1938*. His paper on "Rubber Pendulum, Joule Effect, and the Dynamic Stress Strain Curve", was published in the *Institute of Rubber Industry Transactions*, October, 1934, and his paper on "Vulcanizing Characteristics of Reinforcing Furnace Carbons", was published in the *India Rubber World*, March, 1948. Early in his career, Mr. Snyder made a study of the chemistry of colloids. Consequently, one of his early assignments was the development of special dispersions of carbon black for the paint and allied industries. This field has developed into the complete line of co-dispersions or base dispersions of carbon black in various organic media.

HARVEY H. HOLLINGER, treasurer of the Firestone Tire & Rubber Co., was recently awarded a diamond-set pin to mark the completion of 35 years' service with the company.

MARVIN W. SMITH, formerly associated with Westinghouse Electric Corp., has been elected executive vice-president of the Baldwin Locomotive Works, with headquarters at the company's main office in Eddystone, Penna.

Monteith Named At Dayton

V. St. C. Monteith was appointed manager of the Plant Engineering Department, Dayton Rubber Co., Dayton, Ohio, recently, succeeding L. B. Gordon, whose death occurred in April of this year. Mr. Monteith became associated with Dayton in 1945, and since that time has been handling special assignments in the Engineering Department. A native of West Virginia, he graduated in 1933 from West Virginia University with a B.S. degree in electrical engineering. After leaving the university, Mr. Monteith joined the Kelly Springfield Tire Co., where he served as assistant chief engineer, and during the war-time period as chief engineer in the manufacture of Army eight-inch shells. He joined Dayton Rubber directly from this position. Mr. Monteith is a member of the National Association of Foremen.

HAROLD A. SHANK, associated with the U. S. Rubber Co. since 1936, has been appointed manager of the company's aircraft tire department with headquarters in Detroit, Mich.

LOUIS J. HEALY, formerly district manager of the San Francisco branch of the U. S. Rubber Co., has been appointed Pacific Division sales manager of footwear, clothing, foam rubber mattresses and pillows. Mr. Healy was succeeded as San Francisco manager by JEROME H. WHITE who has been associated with the company for more than 11 years.

RAY A. MACPHERSON, formerly associated with the Standco Brake Lining Co., of Houston, Tex., and Raybestos-Manhattan, Inc., has joined Thermoid Co., Trenton, N. J., as manager of its Industrial Friction Materials Sales Division.

G. JOSEPH KEADY, executive vice-president of Sharples Corp., Philadelphia, Penna., has been promoted to the post of president of the company succeeding PHILIP T. SHARPLES, who has been named chairman of the board.

DONALD B. MCCAMMOND, divisional director of public relations of the Monsanto Chemical Co., has been appointed assistant to the director of industrial and public relations for the company, with headquarters in Everett, Mass., to handle public relations offices in Boston, Mass., Springfield, Mass., and New York.

K. E. BEALL, associated with the Phillips Petroleum Co. since 1920, has been elected vice-president of the company, succeeding J. M. SANDS, who retired this year.

DAVID M. GOODRICH, chairman of the board of the B. F. Goodrich Co., attended the 50th reunion of the Rough Riders Association of which he is president, in Prescott, Arizona, recently.

C. B. HOUSEHOLDER, associated with the Goodyear Tire & Rubber Co. since 1929, has been named to the new position of manager of the fuel tank department of the Aviation Products Division.

Bonstedt Joins Richardson Co.

Ferd Bonstedt

Frank Andrews, sales manager of the Sid Richardson Carbon Co., Fort Worth, Texas, has announced the appointment of Ferd Bonstedt as manager of the Akron Division. Ferd Bonstedt is well known in both the rubber and carbon black industries, having spent twenty-five years in these fields. For the past fifteen years he has been associated with Binney & Smith Company, the last five of which he served as Carbon Black Sales Manager. Mr. Bonstedt is opening the Akron Office, which will be the focal point for all of the carbon black operations of the Sid Richardson Carbon Co. This office will also eventually handle the sale of the Sid Richardson Gasoline Co.'s solvents to the rubber, extraction and paint industries in the Ohio, Michigan and western Pennsylvania area. The office is located in the Evans Savings & Loan Building, 335 South Main Street, Akron, Ohio.

A. C. MUELLER, sales manager of the eastern division of Nuodex Products Co., Inc., Elizabeth, N. J., has resigned his position with the company to establish his own business, the A. C. Mueller Co., manufacturer's representatives for the greater Cleveland, Ohio, area, in which territory he will represent the Nuodex Co., among others.

DR. CARY R. WAGNER, for the past year vice-president in charge of Research and Development of General Aniline & Film Corp., has been named vice-president in charge of operations of the company.

FRANK L. ARMITAGE, vice-president and general manager of the Firestone Rubber & Latex Products Co., Fall River, Mass., has been awarded a 35-year service pin, by the parent company.

FINANCIAL NEWS

American Cyanamid Co.

First Half: Net income of $5,071,699, which is equal to $1.85 a common share, compared with $4,315,857, or $1.58 a common share for the same period of 1947. Net sales for the first half of 1948 totalled $114,208,871, against $103,555,216 for the first half of 1947. The earnings do not include the equity in the undistributed net income of associated companies (49 or 50% owned). Including such equity, the net income applicable to the common stock would be increased to $6,851,236, or $2.50 a share, compared with $5,445,299, or $1.99 a share.

Monsanto Chemical Co.

First Half: Net income of $7,926,759, which is equal to $1.73 a share on 4,272,531 shares of common stock, and compares with $9,275,133, or $2.23 a share each on 3,963,163 shares in the first half of 1947. Net sales for the period were $78,739,148, against $71,085,736 for the first six months of 1947. The report covered the company and its subsidiaries excluding the British and Australian affiliates.

E. I. du Pont de Nemours & Co.

First Half: Net income of $11,146,103, which is equal to $5.12 a common share, and compares with a net income of $11,121,927, or $5.13 a share for the corresponding period of 1947. Sales for the six months ended June 30, 1948, amounted to $457,061,050, against $378,671,184 for the like 1947 period.

Phillips Petroleum Co.

First Half: Net income of $36,481,282 after all charges and taxes, which is equal to $6.03 a share, compared with $15,459,699, or $3.14 a share, for the corresponding period of 1947. Gross income for the six months ended June 30, 1948, totalled $212,106,252, against $132,304,216 for the first six months of 1947.

Plymouth Rubber Co.

Six Months Ended May 31: Net income of $155,982, which is equal to 17 cents a common share, and compares with $1,122,704, or $1.24, in the corresponding period of 1947.

New Jersey Zinc Co.

First Half: Net profit of $4,176,095, which is equal to $2.13 a common share, against $4,481,313, or $2.29 a common share, for the corresponding period last year.

Glenn L. Martin Co.

First Half: Net loss of $719,034, after taxes and all charges. While no comparison with the 1947 period is available, last year the company reported a net loss of $19,181,526. Before income charges of $1,332,161 for the six months to June 30, 1948, however, the company showed a profit from operations of $612,127. Sales in the first half of this year totaled $26,688,328. Sales figures for the first half of 1947 are also not available. However, total sales for 1947 amounted to $23,365,722.

U.S. Rubber Co.

First Half: Net income of $10,889,643, which is equal to $4.70 a share on the common stock, and compares with $11,020,729, or $4.78 a share on the common stock in the corresponding period of 1947. Net sales for the first half of 1948 were $278,120,805, compared with $283,329,180 for the corresponding period last year. Earnings were 3.9% of sales, substantially the same as last year.

General Tire & Rubber Co.

Six Months to May 31: Net profit of $1,713,367, after taxes and all deductions, which is equal to $2.46 a common share, and which compares with a net profit of $2,650,912, or $4.06 a common share, for the corresponding period of the previous fiscal year. Sales for the six months ended May 31 totaled $46,782,582, as compared with $61,716,823 for the period ending May 31, 1947.

Heyden Chemical Corp.

First Half: Net profit of $2,039,701, which is equal to $1.58 a share, and represents a 47% increase over the same period in 1947, when net profit was $1,387,502, or $1.03 a share. Net sales, which this year for the first time include those of the American Plastics Corp., a wholly-owned subsidiary, increased to $13,212,963, as compared with $11,348,583, in the comparable period of 1947.

Seiberling Rubber Co.

First Half: Net income of $299,732, which is equal to 59 cents a common share, and compares with $162,663, or 13 cents a share, in the first half of 1947, when revenue was reduced by a six-week work stoppage.

Skelly Oil Co.

First Half: Net income of $18,398,562, which is equal to $18.74 a common share, which compares with $7,621,151, or $7.76 a share, for the corresponding period of 1947.

Mathieson Buys Ammonia Plant

The War Assets Administration and the Mathieson Chemical Corp., New York City, have concluded an agreement for the chemical company to purchase the ammonia plant and ammonia oxidation facilities at Lake Charles, La., for a reported purchase price of $7,063,300. Built by Mathieson for the Defense Plant Corp., the plant was leased to the company and production began in the fall of 1944, the entire output going into the manufacture of high explosives. Early in 1947 the company negotiated with the government for a long-term lease for the facilities, and after extensive rehabilitation the plant was put into full operation. According to company officials, the purchase of the plant establishes Mathieson as a major producer of synthetic ammonia.

Sun and Midwest Strikes Continue

At this writing, strikes at the Sun Rubber Co., and the Midwest Rubber Reclaiming Co., Barberton, Ohio, were still in progress. The Sun strike, which has kept 1,200 men out of work since May 8, revolves around a union shop issue. The federal conciliator reported that both sides are standing firm in their demands, and hopes for an early settlement are slim. The dispute between labor and management at Midwest has to do with an hourly wage rise, the company offering 11 cents an hour, while the union holds out for 19 cents an hour. (NOTE: The Midwest strike has since been settled).

Settle Dow Chemical Strike

Workers at the Dow Chemical Co. plant in Midland, Mich., returned to work on August 1, following settlement of a plant-wide strike which began on July 6. The settlement gives the workers an immediate increase of seven cents per hour. The agreement was worked out between the company and Local 12078 of the United Mine Workers. A cost of living bonus, effective as of July 1, 1948, is a feature of the contract which runs until July 1, 1950.

Swan Asks Annexation of 22 Acres

Swan Rubber Co., 436 E. Mansfield St., Bucyrus, Ohio, has petitioned the City Council of Bucyrus, requesting that the city annex 22 acres of land lying within the township into the city limits. The company is planning to improve the property for expansion purposes, and desires additional city fire and police protection. The matter was held in abeyance in the city council pending a review by county officials.

Assets of Atlas Auctioned

All equipment and assets of the Atlas Rubber Co., Inc., 110 Delawanna Avenue, Delawanna, N. J., were sold in one lot at public auction on July 20. Although the purchaser was not revealed, it was understood that the equipment will be resold, at some later date, in individual lots.

MAY CARBON BLACK PRODUCTION SHOWS GAIN OVER APRIL TOTALS

According to a report issued by the Bureau of Mines, production and shipments of channel and furnace blacks in May were larger than those in April. Production of channel blacks in May totaled 57,653,000 pounds, compared with the 54,556,000 pounds produced in April. Furnace blacks produced in May totaled 55,569,000 pounds, against the 53,613,000 pounds produced in April. A total of 113,222,000 pounds of all types of blacks were produced in May, which compares with 108,169,000 pounds in April.

Shipments of channel blacks in May were 57,566,000 pounds, while 50,730,000 pounds were shipped in April. Furnace blacks shipped in May came to 49,998,000 pounds, compared with the 47,102,000 pounds shipped in April. Total blacks shipped in May were 107,564,000 pounds, while 97,832,000 pounds were shipped in April. Exports also gained considerably in May, when 32,354,000 pounds were exported, compared with the 21,668,000 pounds exported in April.

Producers' stocks of channel black at the end of May stood at 9,835,000 pounds. At the end of April, producers' stocks totaled 9,748,000 pounds. Furnace blacks on hand at the end of May came to 87,851,000 pounds, while at the end of April, 82,280,000 pounds were on hand. Total blacks in producers' stocks at the end of May were 97,686,000 pounds. At the end of April, 92,028,000 pounds of black were on hand.

Zero Fahrenheit Synthetic

Dr. S. M. Cadwell, director of research and development for the U. S. Rubber Co., recently disclosed that a new GR-S synthetic rubber with superior wearing qualities is now being manufactured by U. S. Rubber at the unprecedented low temperature of zero Fahrenheit. According to Dr. Cadwell, this new type synthetic shows promise of being even better than GR-S made at 41° F., developed during the past six months, which is reported to increase tire wear 30% over the best natural rubber treads.

J. C. Wood Injured in Fall

J. C. Wood, Ohio representative of the R. T. Vanderbilt Co., suffered a broken right pelvis and several fractured vertebrae last month in a fall from the roof of his home in Akron. After several weeks in St. Thomas Hospital, "Woody" is now recuperating at his home at 1143 Sunset View Drive, where he will be confined for another two or three months according to reports.

Graybar To Handle Uskon

U. S. Rubber Co. has named the Graybar Electric Co. exclusive distributor for Uskon conductive rubber panels used in the radiant heating of homes by electricity. The Graybar Co., with offices in 103 cities, will handle the distribution of the panels on a nation-wide scale through electrical contractors.

Joins Binney & Smith Technical Staff

Francis W. Kenney has been appointed to the Technical Service Department of Binney & Smith Co., New York City. In his new position, Mr. Kenney will handle problems connected with the use of carbon black and carbon black dispersions in the plastics, paper, paint and ink industries. Mr. Kenney was graduated from the University of Colorado in 1940 with a B. A. degree in chemistry. He has been successively employed as an instructor at Montana State College, as a research chemist in the heavy chemical industry, and as a development chemist with the General Printing Ink Division of the Sun Chemical Corp. Recently, he completed an enlistment in the U. S. Army's Chemical Corps, serving as a research chemist at the San Jose Island Project, Republic of Panama.

Colonial Rubber Signs With URW

The Colonial Rubber Co., division of the Chamberlain Engineering Co., Ravenna, Ohio, signed an agreement with the URW providing for an 11 cent an hour wage increase on July 22. The new contract also provided for paid vacations, overtime pay, and other features of the contracts which were generally being signed by other companies in their settlements with the URW.

Operating Fatty Acid Plant

Operation of General Mills' new chemical plant at Kankakee, Ill., was scheduled to begin in August for the manufacture of fatty acids and fatty acid derivatives. Arthur P. Berry has been named to manage the fatty acid operation. Approximately 100 persons will be employed at the plant.

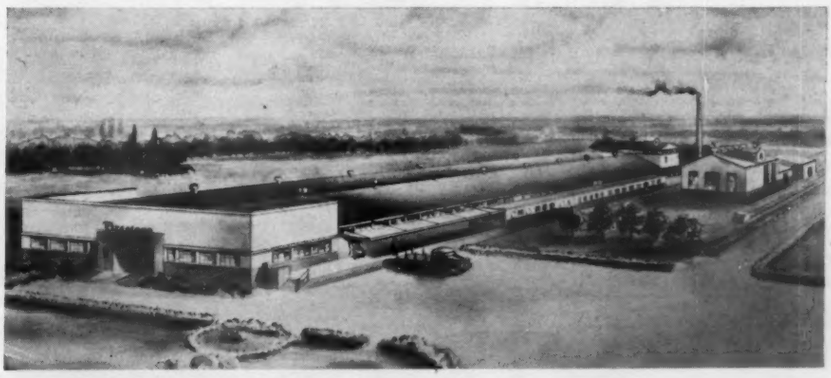
Vinylum 45 Aluminum Powder

Argus Chemical Laboratory, Inc., 56 Clifton Place, Brooklyn 5, N. Y., has introduced Vinylum #45, a blend of ultrafine, polished aluminum powder and a special vinyl copolymer which contains a dispersing agent of unusual efficiency. The use of Vinylum #45 will eliminate differences in color intensity in metallic and iridescent compounds, according to the company. In addition, its use will eliminate the usual 10-15% weight loss when ordinary aluminum powder is used, thus effecting compounding economies and avoiding dust in the plant. The product is completely compatible with vinyl resins and plasticizers, and will not materially alter the processing characteristics of the compound to which it has been added; nor will it materially effect its physical properties, such as tear and tensile strength. Vinylum #45 disperses easily and quickly in vinyl compounds. Although it contains only 45% by weight of aluminum, the hiding power and metallic luster is said to be higher than the conventional powders and pastes. The product is efficient in small quantities, requiring only 4 parts on 100 vinyl resin to produce satisfactory results.

Goodrich To Build Akron Plant

Construction work on a new multi-million dollar plant for the manufacture of industrial rubber belting will be started shortly in Akron, Ohio, by the B. F. Goodrich Co., according to recent company statements. The new expansion plans mark the first such building in 20 years, and is attributed to increased demand for conveyor belting. The new plant will have 150,000 square feet of floor space, and the framework alone will require 2,000 tons of structural steel.

TIRE AND TUBE FACTORY COMPLETED BY FIRESTONE IN NEW ZEALAND

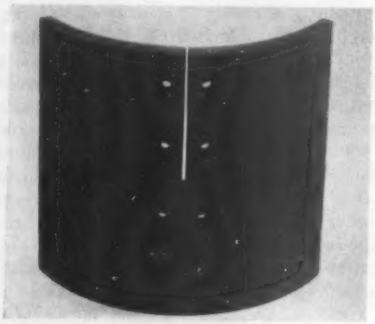


The first tire ever to be produced in New Zealand was recently completed in a new factory built by the Firestone Tire & Rubber Co. at Papanui, near Christchurch. Harvey S. Firestone, Jr., chairman of the company, declared that the opening of this new tire and tube factory completed the latest link in the company's round-the-world manufacturing operations. Other foreign manufacturing plants of the Firestone Co. are in Canada, England, Spain, Switzerland, South Africa, India, Brazil, Sweden and Argentina. The New Zealand plant was completed in June. American production supervisors are now training a staff of New Zealanders to handle all production problems and the output of tires is said to be increasing daily.

NEW RUBBER GOODS

Heavy Duty Brake Block

A recent innovation in the manufacture of brake linings by the Goodyear Tire & Rubber Co., has resulted in a two-piece, heavy duty brake block for full coverage truck and bus linings, rather than a one-piece unit per brake shoe which was previously offered. The company claims



that the new type of construction assures the same amount of density throughout the entire surface of the lining, with the distinct advantage of even, long wear. The new lining is made in both the Goodyear All-Weather compound, and of Goodyear YKL, brass chip compound. The illustration shows both the former one-piece, and the new two-piece construction. In the latter, the extremely small loss of braking area resulting from the open space, is far offset by the fact that the shorter arc offers opportunity of molding a more efficient product.

Velvet-Texture Vinyl Film

The General Products Division of the Goodyear Tire & Rubber Co. has announced production of a tough, plastic film with sunfast colors and the texture of velvet. Designed for the fabricating trade the new material is already being used by a number of fabricators in the production of high quality wearing apparel, notions, and as a home decorating material, company officials stated. The material is both water and weatherproof, is soap resistant and can be washed without losing its original texture. It is also resistant to oils, greases, alkalis and gasoline and is not affected by ordinary solvents. It is resistant to flame and to tearing and will not crack, stick, peel or mildew. Goodyear claims that the material can also be heat-sealed to itself. The film is being produced 36 to 54 inches wide and in gauges ranging from four to eight mils in thickness.

Bristol Co., Waterbury 91, Conn., recently published a bulletin, No. PB1237, which describes the company's new electronic proportioning current-input electronic pyrometer.

Laytex RUW Water-Resistant Wire

A new electrical wire with rubber insulation that improves when soaked in water has been developed by the U. S. Rubber Co. The wire, called Laytex RUW, is designed for use underground and in wet locations where high moisture resistance gives it longer life and increased safety. It is particularly suitable for underground lead-ins and wiring damp basements. According to the company, the secret of the wire's durability is a coating of high purity natural rubber latex applied by the dip process. Tests conducted by Underwriters Laboratories, Inc., where the wire was immersed in water at a temperature of 122° F. for 24 weeks, showed an insulation resistance curve that rose from 500 megohms to 2,400 megohms per 1,000 feet of wire.

Static-Conducting Hose Nozzle

A new gasoline-hose nozzle, made with a rubber tube that needs no metal reinforcement and is static-conducting, was announced by the B. F. Goodrich Co. recently. Made of a special compound of synthetic rubber, the nozzle has been shown in field tests to guard against fire or explosion by providing an instantaneous ground at every point, yet because the actual nozzle is all-rubber for nine or ten inches, it greatly reduces the danger of chipping car finishes or porcelain panels on the gas pumps.

Farm Tires Added To Line

Pennsylvania Rubber Co., Jeannette, Penna., has added a complete range of farm service tires to tis line. Featuring the T-Grip rear tractor tire, the new line offers tires for very farm need, including both multiple rib and single rib tractor tires, rib implement tires and the Pennsylvania V. C. cleat tire. The company claims that its new T-Grip rear tractor tire has superior traction.

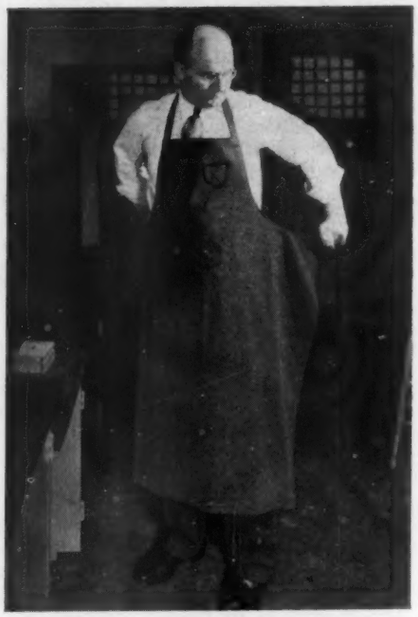
Voit TF1 Jr. Official Football

The Voit Rubber Corp., Los Angeles, Calif., has introduced the new Voit TF1 "Jr. Official" football. Built for small

hands, the TF1 is made of tough, pebble-grained rubber, has molded lacing, and is designed so that it may be kicked and passed like the real thing.

Fiberglas Laboratory Aprons

The Fisher Scientific Co., Pittsburgh, Penna., and Eimer & Amend, New York City, are marketing a new laboratory apron made of cloth woven of Fiberglas yarns and coated with neoprene, which is said to



afford laboratory workers with maximum protection. The apron is wide enough to protect the sides of the wearer from lateral splashing. It is designed to come to within four inches of the average wearer's neck and to hang about six inches above the floor. Possessing high tear strength, the coated Fiberglas cloth is resistant to burning, and to all common laboratory reagents.

"Form-Fitted" Foamex Mattresses

Firestone Tire & Rubber Co. introduced its new Foamex "form-fitted" foamed latex mattress at a showing at the Mid-Summer Home Furnishing Market in Chicago, Ill., recently. Improvements in basic construction design are said to enable the new mattress to support the heavier parts of the body with the same relative comfort with which the lighter parts are cushioned. The structural changes are effective by narrowing the core or pinholes in various parts of the mattress. The central section thus is composed of relatively thick walls of Foamex as are the two outer walls of foamed latex at the edges. The mattress is available in both single and double bed sizes.

Geon Polyblend compounds can be extruded approximately 50% faster on standard equipment than ester plasticized Geon compounds of the same hardness, and at a considerably lower optimum extrusion temperature, according to recent tests conducted by B. F. Goodrich Chemical Company. The optimum extrusion temperature of Polyblend compounds is approximately 40°F lower than that of ester plasticized stocks.

Phillips Forms Chemical Company

Phillips Petroleum Co., Bartlesville, Okla., has formed a wholly-owned subsidiary, Phillips Chemical Co., to handle all its chemical production and to expand this activity, particularly in fertilizers. The new company will conduct all Phillips' chemical and synthetic rubber operations, as well as the furnace black operations now being carried out through Philtex Chemical Co. Frank Phillips is chairman of the new company, K. S. Adams, president, and Ross W. Thomas, executive vice-president. Under the new program, Phillips Chemical has leased on a long-term basis the Cactus Ordnance Works at Etter, Texas, where it will also build a new ammonium nitrate plant. The lease agreement provides that the Government may purchase products from this plant for foreign relief purposes until June 30, 1952. The company also plans to acquire a large site on the ship channel near Houston, Texas, where it will build an ammonium sulfate plant for fertilizer production and several other chemical plants.

Course On Instrumentation

The Agricultural and Mechanical College of Texas, at College Station, Texas, will offer their third short course on "Instrumentation for the Process Industries", on October 26, 27, and 28. The course will be conducted as a seminar with lectures and discussions on the subject of automatic control.

Pennsylvania Rubber Co. has added a new range of lower priced tires to its line under the trade name of Keystone Deluxe.

Koppers' Polystyrene Adhesive

The Chemical Division of Koppers Co., Inc., has announced the development of a new adhesive for bonding polystyrene either to other pieces of polystyrene or to certain other solids. When bonds are made with this adhesive, one joint element must be polystyrene. The other joint element may be rubber, paper, cardboard, fabric, glass, or certain other plastics. Advantages claimed for the adhesive include: quick initial set; it minimizes etching; can be applied with a small brush; used as a cement to form clear, bubble-free bonds. It is now available in 55 gallon drums, in five and one gallon cans, and in quart or pint glass bottles.

Explosions At Farben Plant

Explosions at the I. G. Farben plant at Ludwigshafen, Germany on July 28 and 29, resulted in the death of over 200 persons, and injured 6,000 more, according to estimates by U. S. Army officials. Although the blasts took place in the French occupation zone, Americans played a major role in firefighting and rescue work. The origin of the blast was not determined. Damage to the plant was estimated at approximately 80% destroyed.

Morgan Nylaflex Bankrupt

Voluntary bankruptcy petitions were recently filed in U. S. District Court in Cincinnati, Ohio, by Morgan Nylaflex, Inc., tire reclaiming and patch manufacturing concern of that city. Its president, John A. Brouwer, and the company, also operating as the Morgan Tire Co., listed debts of $42,897.31, and assets, for which an exemption was claimed, of $500.

Goodyear Chemical Appointments

Raymond S. Earhart has been appointed operating manager of the new Chemical Division of the Goodyear Tire and Rubber Co., and Robert S. Sanders has been named manager of Pliobond sales for the division. Mr. Earhart joined the Goodyear organization in 1940 as a store employee at Dayton, Ohio, later transferring to Huntington, W. Va. His business career was interrupted with his entry into the U. S. Army. Upon his return from service he was named to the sales staff of the Plastics and Coatings Department, from where he was advanced to his new post. Mr. Sanders, a 25 year veteran with the company, served the Plastics and Coatings Department as office manager from 1943 to 1946 when he was assigned to technical sales, which post he held until his recent advancement.

Davidson Rubber Appoints Seck

The Davidson Rubber Co. of Boston, Mass., has appointed Joseph G. Seck as assistant to the general manager in charge of sales promotion. Mr. Seck's appointment was in line with Davidson's new program to offer merchandising assistance to wholesale and retail drug outlets. He was formerly connected with the manufacturing division of McKesson and Robbins, Inc., and the Rubber Manufacturers Association.

Reports from the East Indies point to rubber exports running 23 to 30% higher than in 1947. Plantations are being rapidly rehabilitated, even in areas where there has been some friction between natives and the Netherlands authorities.

View of the opening session of the Rubber Technology Conference which was held in London, England, from June 23 to 25, a complete report on which appeared in our previous issue.

LOS ANGELES NEWS

The big news in the Los Angeles area during the past few weeks was the annual two-day outing of the Los Angeles Rubber Group, Inc. This year the outing was held on Saturday and Sunday, July 24 and 25, at Catalina Island, and attracted approximately 170 members and guests, including the editor of RUBBER AGE. Catalina Island is reached by boat from the California mainland, the trip taking about two and one-half hours. The island is a vacation resort and boasts innumerable attractions. Most of the activities of the Group took place at the Catalina Country Club, one of the most complete clubs of its kind in the country.

A complete program of sports activities was provided for Group members and guests, with special prizes awarded to winners in all events. In addition, sufficient door prizes were distributed so that every one attending the outing received a gift of some kind. A television set was offered in a lottery and was won by Charles Lamb, Jr. (Lamb Rubber). Winners of the various sports events follow:

Tennis, Phil Drew (Goodyear) and Burt Smart (United Carbon); *Darts,* Fred Woerner (Reeves Rubber); *Football Kick,* R. W. Johnson (Rubber Products); *Football Pass,* Cam Johnston (Caram Mfg.); *Sack Race,* Al Federico (C. P. Hall Co.); *Three Legged Race,* R. L. Short (Kirkhill Rubber) and Tonnie Hoyle (Goodrich Chemical); *Wheelbarrow Race,* Bill Snyder (Vanderbilt) and Al Federico (C. P. Hall Co.); *Horseshoe Pitching,* Dixson Sheppard (Goodyear) and William Michalok (Kirkhill Rubber); *Egg Throw,* Leonard Boller (Technical Coating) and Cam Johnston (Caram Mfg.).

Prizes were also awarded for deep sea fishing prowess, two fishing boats leaving Catalina Island early in the morning of the second day of the outing. Over 30 members and guests went fishing and since there were two boats, there were two first places for each event. Winners included the following: *Largest Fish,* Tom Disken (Western Insulated Wire) and Fred Woerner (Reeves Rubber); *Smallest Fish,* Dick Zirken (Shell Chemical) and D. W. Burson (H. M. Royal); *Most Fish,* John Galitza (S & G Rubber) and Glenn Goes (Kirkhill Rubber). A baseball game was also held between manufacturers and suppliers, the game ending in a 7-7 tie.

The golf tournament, always a feature of the Group's outings, attracted some 60-odd players, with the following results: *Low Gross,* Al Pickard (Braun Corp.), with Bill Fairclough (Enjay) as runner-up; *Low Net,* E. L. McLaughlin (H. M. Royal); *High Gross,* Kal Simon (S & G Rubber), with Joe Larkin (Patterson-Ballagh) as runner-up; *Longest Drive on First Hole,* Al Fuhrmann (Midwest Rubber Reclaiming); *Tee Shot Closest to Hole,* Tway Andrews (H. M. Royal), with Dave Parrish (Goodrich Chemical) as runner-up; *Longest Putt on 18th Hole,* R. A. Lees (American Anode); *Low Number of Total Putts,* A. J. Hawkins (DuPont), with C. T. Erickson (Plastic & Rubber Products) as runner-up; *High Score on "Blind" Hole,* Walt DelMar (Adamson-United); *Most Sand Traps,* Ed Wilson (Golden State Rubber Mills). The "blind bogey" was won by Lloyd Parks (Sharples Chemicals). A "Calcutta Auction" was held in connection with the golf tournament.

The success of the two-day outing was due in large measure to the various committees in charge of events. C. H. Churchill (Sterling Rubber Products) was chairman of the General Outing Committee, and was capably assisted by the following chairmen of sub-committees: *Outing Tickets,* R. L. Short (Kirkhill Rubber); *Raffle Tickets,* Curtis Wolter (Witco Chemical); *Reception and Housing,* Carl S. Hoglund (Goodyear); *Publicity,* E. C. McLaughlin (H. M. Royal); *General Sports,* F. C. Johnston (Caram Mfg.); *Golf,* A. H. Federico (C. P. Hall Co.); *Fishing,* Jack A. Knudson (Kirkhill Rubber); *Prize Distribution,* J. R. Morath (Naugatuck Chemical).

The outing was complete in all details, from the departure from the Catalina Terminal in Wilmington, Calif., on the morning of July 24 to the return to the Terminal on the evening of July 25. The price of a ticket included all meals, including a barbecue lunch at the Country Club on Sunday afternoon. Members and guests were housed in various hotels on Catalina.

View of the barbecue lunch which was one of the features of the annual outing of the Los Angeles Rubber Group held on July 24 and 25 at the Catalina Country Club on Catalina Island.

Appointed Engineering Manager

Martin B. Uhrich

Martin B. Uhrich has been appointed engineering manager of the Goodyear Tire & Rubber Co. plant in Los Angeles, Calif. This will mark the second time that Mr. Uhrich has served at the West Coast plant. He was engineering manager there from 1930 to 1940. Mr. Uhrich, whose latest position was as analyst of equipment maintenance at the Akron plant, has been with the Goodyear company for nearly thirty years.

H. Rue, formerly associated with the Franklin Rubber Co., and G. Gertler, of Chicago, have purchased the interests of Phil Suka and "Shorty" Price in the Mission Rubber Co. Mr. Suka has joined the recently-organized H. C. Lien Rubber Co. and Mr. Price is now affiliated with the Western Rubber Products Co.

A unique promotion in support of sales of its basketballs was recently launched by the W. J. Voit Rubber Corp. Twenty-five basketballs (one each day at noon)

were cast overboard from the deck of the *S.S. President Wilson* during the recent maiden voyage of that ship from Los Angeles to the Orient. To each ball was attached a brass capsule requesting the finder to return the ball and the message to Voit Rubber headquarters, with a Voit Sports Chest to be awarded to such finders. Oceanographers at Scripps Institute at La Jolla, Calif., have requested data on the drift of the balls.

E. R. "Eddie" Evans and C. L. "Charley" Arends have joined California Rubber Products, Inc., as sales manager and factory manager, respectively. Mr. Evans was most recently associated with the Patterson-Ballagh organization and prior to that with the Mare Island Rubber Laboratory. He also spent many years with the local Firestone organization. Mr. Arends was most recently with the Master Processing Co.

Howard C. Lien, who sold his interests in the Atlas Sponge Rubber Co. a few years ago and who has been operating a ranch property in Texas since, has returned to Los Angeles and has organized the H. C. Lien Rubber Co. at 1178 East 63rd Street. The new company will manufacture molded sponge rubber goods. Phil Suka, formerly a part owner of the Mission Rubber Co., has joined the new company.

Bob Reese, purchasing agent of the local plant of American Anode, Inc., and assistant to R. A. Lees, general manager of the plant, has announced the birth of a third son, Charles David.

H. O. Keefer, who was associated with the Huntington Rubber Co. before its recent acquisition by Voit Rubber, is now associated with the Union Rubber Co.

The formation of the Stillman Rubber Co. at 12224 South Budlong Ave. has been announced by C. D. Stillman and H. W. Sears, both of whom were formerly associated with the Plastic and Rubber Products Co. The new company will manufacture mechanical goods, specializing in the use of Silastic rubber.

Walter T. Deegan, associated with the Chicago office of the Monsanto Chemical Co., will henceforth cover the local area for that company. Charles Fetzner remains as local branch manager of Monsanto.

The birth of a daughter, Carolee Candise, to Mrs. Snyder, their first, was recently announced by B. R. "Bill" Snyder, popular local sales representative of the R. T. Vanderbilt Co.

The local headquarters of the DuPont Rubber Chemicals Division has been moved from 5801 South Broadway to 845 East 60th Street. The new telephone number is ADams 3-5206. A. J. "Lucky" Hawkins is the local representative for the Division.

Joins Brokerage Concern

Alexis Tatistcheff

Alexis Tatistcheff, formerly principal economist with the Combined Raw Materials Board, has joined the brokerage firm of Merrill Lynch, Pierce, Fenner & Beane as manager of its hide and rubber department. Mr. Tatistcheff was also previously associated with Commodity Exchange, Inc., in New York City, as chief statistician. Company officers stated that the appointment was a consequence of the returning importance of free markets in those commodities in which free trading was suspended during the war.

Thomas Joins General Latex

Robert E. Thomas, previously chief chemist of the Midwest Rubber Co., Detroit, Mich., has joined the development staff of the General Latex & Chemical Corp., Cambridge, Mass., where he will specialize in latex dipping compounds. Mr. Thomas is a graduate of Pennsylvania State College, and received a Master's Degree at the University of North Carolina. He has been associated with the research and development of latex compounds for nearly twenty years.

The consolidation of all the operations of the Avery Adhesive Label Corporation, producer of the well-known Kum-Kleen self-adhesive labels and tapes, at its recently completed plant in Monrovia, Calif., has been announced by H. Russell Smith, vice-president and general manager of the company. The new Monrovia plant now houses the company's factory.

The fiftieth anniversary picnic of the Goodyear Tire & Rubber Co. was held at Euclid Beach Park, Cleveland, Ohio, on August 9.

The Wetherbee Chemical Co., 525 Washington Highway, Buffalo 21, N. Y., has been appointed sales and technical representatives for Allied Asphalt & Mineral Corp. in the western New York area.

Recent Violence In Malaya

Recurrent violence in Malaya has prompted the British House of Commons, under the urging of Colonial Secretary Creech Jones, to pass adequate emergency measures for the protection of life and property in that territory. Lord Listowel, Minister of State for Colonial Affairs, said that the police were satisfied that some of the crimes recently committed were not politically inspired. However, the Government, he said, was fully aware that Communist terrorists were behind many of the acts of violence. According to dispatches from United Press correspondents, during May and June there were 50 murders, many more attempts, and a dozen attacks in which rubber factories and plantations were destroyed. British High Commissioner Gen. Malcolm MacDonald in Singapore has stated that Britain would wage all-out war against the terrorists, to prevent them from "taking over the country."

Goodrich Announces Appointments

Three new appointments were recently announced by the B. F. Goodrich Chemical Co. H. F. Miller was named production manager of plants with headquarters in Cleveland, Ohio. A plant manager in Akron since 1942, Mr. Miller is a graduate of Purdue University, and has been associated with Goodrich since 1926. Second of the appointments went to H. B. Warner, who was named plant manager of the Avon Lake Experimental Station. Mr. Warner is a graduate of Ohio State University, and joined the company in 1939 as a chemist at the main plant in Akron. In 1940 he was transferred to the Niagara Falls Geon plant, where he was made plant manager in 1942. Since May of this year he has been serving as assistant to the vice-president of manufacturing, W. I. Burt. F. C. Hands was named as production manager of Plant 3, in Akron, succeeding Mr. Miller. Associated with Goodrich since 1935, Mr. Hands is a graduate of the University of Illinois.

Shell Chemical Opens Texas Unit

A new multi-million dollar chemical plant for the manufacture of methyl ethyl ketone and secondary butyl alcohol is now on stream at Houston, Texas, company officials of the Shell Chemical Corp. announced recently. The third of its type to be brought on stream by the company, the new plant is said to increase the firm's capacity for these products by 150%. The new unit is part of a $43,000,000 expansion program undertaken by the company in 1946. The entire program is expected to be completed sometime this year.

Opens New York Sales Office

Mineral Pigments Corp., Muirkirk, Md., has opened a New York sales office at 1261 Broadway, with George M. Ferguson in charge as district sales manager. Mr. Ferguson will serve in a sales and technical capacity in the greater New York area. The company will complete this year at its Muirkirk plant an initial $350,000 expansion of its program.

CANADIAN NEWS

Arnold H. Smith, formerly vice-president and member of the board of the Monsanto Chemical Co. of Canada, Ltd., was recently elected president of the company, with offices in Montreal. Mr. Smith was educated in Akron, Ohio, and at the Armour Institute of Technology in Chicago, Ill., where he received his B.S. degree in Chemical Engineering in 1917. He was associated with the Bureau of Standards in Washington, D. C., from 1917 to 1919; with the Goodyear Tire & Rubber Company's research laboratories from 1919 to 1921, and with the Thermoid Co. in 1921 and 1922. Mr. Smith entered Monsanto's Rubber Service Laboratory at Akron in 1922, serving successively as technical sales manager and assistant sales manager. From 1930 through 1940, he was stationed in London, first as manager of the rubber chemical department, and later as a director of Monsanto Chemicals, Ltd. Mr. Smith was transferred to St. Louis, Mo., in 1940 as manager of petroleum chemical sales, and in 1944 became assistant director of the foreign department. He was later named director of Monsanto's Foreign Department. In 1946 Mr. Smith was appointed acting manager of Monsanto (Australia) Pty. Ltd. He was elected a vice-president and a member of the board of directors of the Canadian subsidiary on January 1, 1948.

The membership of Local 113, United Rubber Workers of America (CIO), recently voted to accept the latest wage proposals advanced by representatives of the Firestone Tire and Rubber Company. The company increase altogether amounts to an average boost of 11 cents per hour, Thomas Rice, publicity director of the local, reported.

The new contract specifies an increase of 10 cents per hour to all day and time cycle workers, plus two paid statutory holidays. All piece workers get an increase of 9 cents per hour while engaged in incentive production, plus two paid statutory holidays. Piece workers get 10 cents per hour when they are required by operating conditions to work on a day rate basis.

William E. Ecclestone has been appointed assistant manager of the Central Ontario Division of the Goodyear Tire & Rubber Company of Canada, Limited, according to an announcement by Carl B. Cooper, general sales manager. Mr. Ecclestone was formerly in charge of the Maritimes Division. His promotion brings him to Toronto, where he will be stationed at the Company's branch office at Fleet and Bathurst. Born in St. Catherines, Mr. Ecclestone has been associated with Goodyear for a number of years.

A few months ago the Polymer Corp., Sarnia, adopted the brand name Polysar to distinguish between its different types of GR-S and butyl synthetic rubber. In accordance with this procedure, the following code designations have been assigned the various rubbers by the company:

Polymer Code	*ORR Equivalent*
Polysar S	Standard GR-S
Polysar S-10	GR-S-10
Polysar S-17	GR-S-17
Polysar S-20	GR-S-20
Polysar S-50	GR-S-50
Polysar S-65	GR-S-65
Polysar S-AC	GR-S-AC
Polysar S-X-345	GR-S-X-345
Polysar S-X-371	GR-S-X-371
Polysar S Latex I	GR-S Latex Type I
Polysar S Latex II	GR-S Latex Type II
Polysar S Latex IV	GR-S Latex Type IV
Polysar S Latex V	GR-S Latex Type V
Polysar SS 300	(No equivalent)
Polysar N 300	GR-A
Polysar NP 450	(No equivalent)
Polysar Butyl 100	GR-I R-2
Polysar Butyl 200	GR-I-50
Polysar Butyl 201	GR-I R-13
Polysar Butyl 202	GR-I R-15
Polysar Butyl 300	GR-I Y-15
Polysar Butyl 301	GR-I F-18
Polysar Butyl 400	GR-I Y-25

Meredith, Simmons & Co., Ltd., the Canadian affiliate of National Adhesives, has just completed the construction of a glue and adhesives plant which will replace the original installation operated in Montreal, Canada, for many years. According to National Starch Products, Inc., the parent company, the new installation, with the recently remodeled factory at Toronto, will produce a complete line of liquid adhesives, pastes, resin and rubber glues, flexible and non-warp glues, as well as specialty products for use by the paper and textile industries. A substantial tonnage of animal glue and technical gelatin will also be produced in the unit.

A new plasticizer plant, said to be the only one of its kind in Canada, will be in production at Shawinigan Falls this autumn, W. G. Bartram, president of Canadian Resins and Chemicals, Ltd., announced recently. Canadian Resins has also announced plans for the construction of a new plant for the production of thermosetting resins and a 50% expansion in an existing vinyl resin plant.

An open end wage agreement between the Goodyear Tire & Rubber Co., and the URW, was announced recently by local union officials in New Toronto, Ontario. Under the new agreement wages can be negotiated after a 30 day notice by the union, though the present contract does not expire until January 31, 1950.

Arnold H. Smith

Elected president of Monsanto Chemical Co. of Canada, Ltd.

Diamond Alkali Arranges Loan

Diamond Alkali Co., Painesville, Ohio, one of the country's largest producers of basic chemicals, has announced completion of negotiations with the Metropolitan Life Insurance Co. for a commitment to borrow $10,000,000 at 3%. The loan matures July 1, 1968. First Boston Corp. acted as agent for the company in negotiating the loan. The loan was arranged to permit the company to round out a $30,000,000 program of expansion and product development, which includes construction of a chlorine caustic soda plant at Houston, Texas, and extensive modernization of the company's main operations at Painesville, Ohio, and of plants in Cincinnati, Ohio, Dallas, Tex., and Kearney, N. J. Increased demand for Chlorowax, the company's synthetic resin, and other products, made necessary the construction of the additional facilities, company officials stated.

Long-Life Tire Predicted

Dr. Waldo L. Semon, director of pioneering research of the B. F. Goodrich Co., recently addressed the members of the Cleveland, Ohio, Advertising Club where he predicted that the automobile tire will eventually wear as long as the automobile on which it is originally placed. He also pointed out the continually increasing use of rubber in every phase of life and described the new research center of his company at Brecksville, Ohio.

Form Rain Apparel Association

Forty rainwear contractors in the New York City area have formed an organization known as the Association of Rain Apparel Contractors, Inc., with offices at 1192 Broadway. The group will make agreements with rainwear manufacturers' associations, conclude contracts with labor unions and generally foster cooperation among its members.

Named Pigment Sales Director

F.A.C. Wardenburg

Frederic A. C. Wardenburg, European office manager of E. I. du Pont de Nemours & Co., has been appointed director of sales of the Pigments Department in Wilmington, Del., succeeding Dr. D. H. Dawson, whose promotion from director of sales to assistant general manager was recently announced. Dr. Charles J. Harrington, who has been technical representative in the London office since January, was appointed to fill Mr. Wardenburg's position. Mr. Wardenburg has been with the company for 20 years, starting with it soon after he received a bachelor of science degree in mechanical engineering from Princeton University. From 1928 to 1933 he was in the Engineering Department, and from 1933 to 1937 he served in the London office. On his return to Wilmington in 1937 he headed the foreign exchange section of the Treasurer's Department, and later became manager of the banking and foreign exchange section. From March, 1942, to March, 1944, Mr. Wardenburg served as assistant treasurer of the Remington Arms Co., a Du Pont subsidiary. He returned to London in 1944, but later moved to the Explosives Department for work on the atomic energy program which the company undertook for the government. In May, 1945, he became manager of the European office, a position he held until his new assignment.

Services offered by Foster D. Snell, Inc., consultant firm of New York City, covering physical measurements and product evaluation are outlined in a new brochure made available by that concern. Copies are available on request to the company.

An information commttee for the Society of Plastics Industry has been formed in Canada. The new committee, under the chairmanship of D. C. Bythell, of Canadian Industries, Ltd., will disseminate information on the country's rapidly expanding plastics industry.

Zimmerman Named To New Post

Henry J. Zimmerman, general traffic manager of the B. F. Goodrich Co. since 1921, has been named assistant to the vice-president and assigned to special administrative duties. Mr. Zimmerman has spent his entire business career at Goodrich, and is the oldest employee in point of service, having joined the company in 1900. He has been a member of the Great Lakes Shippers Advisory Board since its inception, and is a director of the National Industrial Traffic League. Mr. Zimmerman has been a chairman of the transportation committee of the Akron Chamber of Commerce, and has served in various capacities on the traffic committee of the Rubber Manufacturers Association. Mr. Zimmerman was succeeded as traffic manager by Richard W. Corns, who joined the company in 1934. After attending the University of Akron, Mr. Corns worked as a sales analyst at Goodrich until 1941, when he was transferred to the traffic department.

Offers Road Hazard Guarantee

Pennsylvania Rubber Co., Jeannette, Penna., introduced an unconditional road hazard guarantee on tires produced by the company on July 1. Under the new warranty, dealers are now at liberty to guarantee all lines of Pennsylvania tires against damage occurring from normal road hazards up to 18 months. Dealers are authorized to replace a damaged tire with a new one, charging the customer only for the time that the old one was in use. Passenger tires are guaranteed from nine to eighteen months under the new arrangement. Truck tires are guaranteed for six months and tractor tires for twenty-four months.

Personnel Changes at Rempel

Rempel Manufacturing, Inc., Akron, Ohio, has announced the election of Carl Gish, former factory superintendent, as first vice-president of the company, succeeding Charles Clark, who resigned recently. At the same time, it was announced that D. E. Crabbe, comptroller of the company, has been elected to the board of directors to fill a vacancy. Officers reelected included D. G. Rempel, president, J. W. Shira, president of the Oak Rubber Co. of Ravenna, Ohio, as second vice-president, and Ruth Rempel, secretary and treasurer. Frank Pfeifenroth was named factory superintendent, succeeding Mr. Gish.

Dirigibles Due For Comeback

According to Max Pruss, one of the few survivors of Germany's once renowned zeppelin fleet, the great days of the dirigible are still ahead. Recently interviewed in Frankfurt, Germany, Mr. Pruss declared that the Goodyear Company is currently building huge dirigibles designed to carry 200 passengers, almost three times more than the biggest German zeppelin, Hindenburg, which had a capacity of 72 passengers.

Personnel Changes At Cameron

J. Scheuermann

At the last quarterly meeting of the Board of Directors of the Cameron Machine Co., Brooklyn, N. Y., J. Scheuermann was elected vice-president of the company, and vice-president of Cameron Machine Co. of Canada, Ltd. Mr. Scheuermann is also sales manager of the company. At the same meeting, Ross Mekeel was elected secretary of the company. Mr. Mekeel has served for many years as purchasing agent and will continue in that capacity. Tom Carter, formerly of the New Design Department, was appointed manager of the Engineering Department, succeeding Mr. Donnelly. R. W. Cummings has resigned as secretary of the company, and after a three months vacation will return to act as sales representative in the southern states. E. J. Ward was named to fill one of Mr. Cummings' previous positions as service manager.

Appointed Export Agents

Charles F. Connor & Co., Inc., importers and dealers in rubber and latex, 110 State St., Boston 9, Mass., have been appointed export agents for the products of the Malrex Chemical Co., and the Bunatak Chemical Co., both of Malden, Mass. Malrex material includes mold and rubber lubricants, plasticizers, bonding agents, rubber finishes and color pastes, while Bunatak manufactures a line of palsticizers, tackifiers and processing aids.

West Coast Representative

Walter H. Del Mar has been appointed West Coast representative of Adamson United Co., Akron, Ohio, manufacturer of compression molding presses and other rubber and plastics processing machinery. Mr. Del Mar, a graduate mechanical engineer, will engineer installations not only of presses but of all types of plastics plants. He has set up his headquarters in Los Angeles, Calif., at 5140 Crenshaw Blvd.

OBITUARIES

Curtis J. Harwick

Curtis John Harwick, president and founder of the Harwick Standard Chemical Co., Akron, Ohio, died at his home in Akron after an illness of three weeks, on July 26. Born on April 18, 1900, Mr. Harwick attended school in Athens, Ohio,

and graduated from the University of Akron in 1926. He then joined the B. F. Goodrich Co. as a chemist, remaining with that organization until 1932. Upon leaving Goodrich, Mr. Harwick organized the Standard Chemical Co., for the manufacture of compounding materials for rubber and other industries. In 1946, his business was incorporated under the name of the Harwick Standard Chemical Co. Mr. Harwick was a member of Phi Delta Theta fraternity and the American Chemical Society. He was also a member of a number of social clubs, including the Portage Country Club of Akron. Mr. Harwick was a member of the Akron Chamber of Commerce and a Director in the Akron Savings & Loan Co. He is survived by his wife and two children.

Yasujuro Nikaido

Yasujuro Nikaido, retired head chemist of the former Michigan Chemical Co., died on June 22 at his home in Essexville, Mich., after a lingering illness. He was 80 years old. Mr. Nikaido came to this country as a young man from Japan and graduated from the University of Nebraska, where he specialized in the study of the beet sugar industry. He went to the Michigan Chemical Co. as head chemist in 1918, and during his more than 20 years of work there patented several valuable chemical formulas for fertilizers and vulcanization of rubber. He was an emeritus member of ACS, having joined in 1900.

George W. Dolan

George W. Dolan, chairman of the board of the Mathieson Chemical Corp., died on July 24 at St. Clare's Hospital in New York City at the age of 46. Born in Cleveland, Ohio, Mr. Dolan attended Western Reserve University. He became associated with the Mathieson concern in 1930, and later was appointed manager of its carbon dioxide division. In 1944 he was elected president of the company, and this year he was elected chairman of the board. He was also president of the Southern Carbonic Co. of New York, and the Bray Chemical Co. of Chicago, Ill., as well as a member of the advisory board of the Marine Midland Trust Co. During the recent war, he was assistant chief of the Chemical Warfare Service, United States Army Procurement District 1. Mr. Dolan was a member of the New York Athletic Club, the Winged Foot Golf Club and other athletic and social organizations. His wife and son survive.

Edgar Josephson

Edgar Josephson, research chemist, and former second vice-president of the Laurel Rubber Co, Garfield, N. J., died on July 17 at his home in Passaic, N. J. He was 64 years old. Mr. Josephson was graduated from the Columbia University School of Chemistry in 1900. Two years later, he joined the Pantasote Co., manufacturers of artificial leather in Passaic. He left that organization to found the Laurel Co., of which he was a director as well as a vice-president, prior to his retirement several years ago. Mr. Josephson was active in Rotary Club affairs, and for a quarter of a century represented the Passaic chapter at the annual conventions of the international organization. He was also a chairman of the Passaic Board of Library Trustees and a trustee of the first Congregational Church in that city. His wife and two children survive.

Arthur C. Corwin

Arthur C. Corwin, manager of the Salvage Department of the B. F. Goodrich Co., died on July 6 at his home in Akron at the age of 64. Mr. Corwin was born in Sparta, Ohio, and went to Akron and to Goodrich in 1919. He was in the same department for 29 years, and would have been eligible for retirement in October. Before joining Goodrich, Mr. Corwin was district school superintendent in Seneca County, Ohio. At Goodrich, he was the first president of the Ten Year Club, a member of the Foremen's Club, and the Twenty Year Club. Services were held on July 9 at the Kenmore Methodist Church, with interment in Bloomfield cemetery, Mt. Gilead, Ohio, on July 10. Mr. Corwin leaves his wife, two daughters and a son.

Boyd M. Steele

Boyd Mager Steele, finance director of the Goodyear Tire & Rubber Co. in Australia, died on July 23, while en route to the United States. Mr. Steele, who was 44 years old, died of a heart attack aboard the S.S. Lakemba two days out of Honolulu, while on his way home on a periodic leave. He joined Goodyear immediately after his graduation from the University of Virginia in 1926. Mr. Steele did both operating and sales work before going to the India plant as auditor in 1928. Later, he was office manager of the Goodyear-Java organization and went to Australia in 1939. He was appointed finance director in 1942. Mr. Steele was buried at sea on July 24. His wife survives.

Carey L. Youngs

Carey L. Youngs, vice-president, secretary and a director of the Youngs Rubber Corp., New York City, died at his home in New York on August 9. Born in Lansing, New York, Mr. Youngs received his education in that state. Surviving are his brothers, Arthur M. Youngs, president and treasurer of the company, Merle L. Youngs, a vice-president of the company, and his wife.

Harry G. Smith

Harry G. Smith, treasurer of the Pennsylvania Rubber & Supply Co., Cleveland, Ohio, since 1908, died on July 29 in Cleveland. He was 70 years old. Mr. Smith had been associated with the rubber industry for almost half a century.

Offer Joint Chemical Program

The program of the National Industrial Chemical Conference will run concurrently with the National Chemical Exposition at the Chicago Coliseum from October 12 to 16, officials of the American Chemical Society revealed recently. Plans are progressing for a schedule of events which will include talks on such broad subjects as chemical markets, chemistry in general industry, management of research, and frontiers of chemistry. Featured at the exposition will be a technical bureau. Here personal information will be dispensed to all who are in attendance who have some particular problem relative to the chemical industry.

Mohawk Rubber Strike Ends

A two-day strike of employees at the Mohawk Rubber Co., Akron, Ohio, ended on July 23, and company officials reported that production was resumed immediately. Union officials of the URW, termed the brief walkout a wildcat stoppage in urging the return to work. About 80 tire builders affected by the strike walked out in a dispute over a new wage rate system. A company announcement stated that the workers had agreed to give the new scale a trial for an indefinite period.

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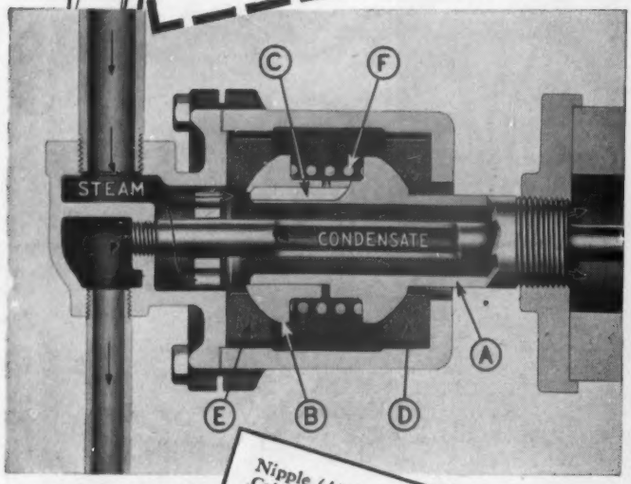

Nipple (A) is connected to roll or drum. Collar (B) is keyed to it (C), but fits loosely so pressure can fill entire housing to act as sealing force. Both seal ring (D) and bearing ring (E) are of carbon-graphite, eliminate packing and oiling. Spring (F) is for initial seating only. Type B Joint shown; other types, sizes for all needs.

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The Johnson Joint was designed to go after the old stuffing box and steam fit troubles in a business-like way, and it literally knocks the stuffing out of them. There's no packing of any kind. There's no oiling required, ever. There's no adjusting — the higher the pressure, the tighter the seal. There's little to fear from misalignment — with provision for both lateral and angular movement built right in. Note besides how neatly it provides for more efficient syphon drainage, through the same head that admits the steam.

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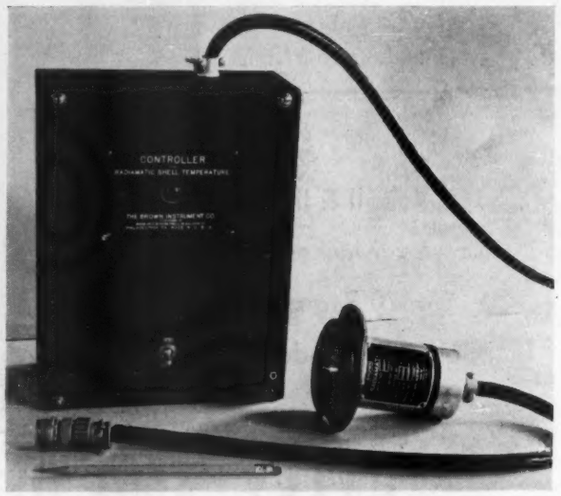
NEW EQUIPMENT

Brown Low Temperature Radiamatic

The Low Temperature Radiamatic, which provides a means of controlling low temperature processes where a thermocouple or thermometer bulb cannot be placed in contact with or sufficiently close to the work to obtain reliable readings, is the latest instrument development of the Brown Instrument Co., 4480 Wayne Ave., Philadelphia 44, Penna. It can be used where vibration and shock would damage other temperature measuring



means, and is already finding application on rubber and plastic mills, plastic finishing rolls, and continuous curing ovens.

The new low-temperature radiation pyrometer includes a complete system which consists of: (1) A low-range Radiamatic head, which is designed for optimum sensitivity in the region of longer wave lengths encountered in temperature under 1,000° F.; (2) A control box which is designed to control the temperature of the Radiamatic head, plus the reference junction of the temperature of the thermopile, at approximately 120° plus or minus one degree. Actually, it maintains the reference junction temperature constant to a fraction of a degree; (3) An electronic recorder, circular or strip chart model, with control features if desired. The recorder is built with a special measuring circuit for use with the low-range Radiamatic head.

The low-range Radiamatic system will respond to temperature changes of one or two degrees Fahrenheit within the span of ambient temperature to 212° F. It is offered as an uncalibrated unit only, since any calibration would depend upon its use under black body conditions or on a target of known emissivity. On many practical applications of the low-range Radiamatic, black body conditions do not exist, nor is accurate data on the emissivity of various substances at these lower temperatures readily available. Furthermore, on most applications the ability to control a process and reproduce the quality of a product is of much greater importance than the knowledge of the absolute temperature. Sighting tubes or other sight-limiting devices will be tailored to an application.

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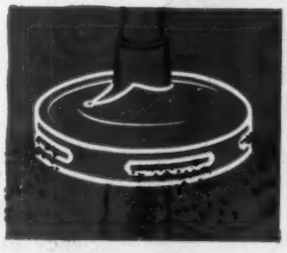

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PHOTO. COURTESY EDMONT MANUFACTURING CO.

DC Antifoam A reduces surface tension in neoprene latex.

In making neoprene rubber coated fabric work gloves, the Edmont Manufacturing Co. of Coshocton, Ohio, found that ordinary foam inhibitors did not reduce surface tension of the latex enough to prevent air from being entrapped in the dipped film. As a result, air bubbles in the coating made the cost of rejects abnormally high. The use of DC Antifoam A in a concentration of about 1 part per 12,000 parts of dry rubber solids, reduced the surface tension materially.

DC Antifoam A is also used to prevent foaming during the concentration and purification of various synthetic latices. Unlike most defoamers DC Antifoam A is effective during vacuum concentration or steam distillation. In the concentration of neoprene and in the purification of butadiene-styrene copolymers, DC Antifoam A is effective in concentrations ranging from 6 to 5,000 parts per million. More information about DC Antifoam A is given in leaflet 16-3.

Our two silicone release agents, DC Mold Release Emulsion No. 35 and DC Mold Release Fluid decrease operating costs, reduce scrap and improve the quality of all kinds of molded rubber goods.

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Chicago: 228 N. LaSalle Street • Cleveland: Terminal Tower
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PHONE OUR NEAREST BRANCH OFFICE OR WRITE FOR OUR NEW 16-PAGE PAMPHLET NO. C 12-V DESCRIBING DOW CORNING SILICONE MOLD RELEASE AGENTS

Dow Corning
FIRST IN SILICONES

Work temperatures between ambient and 1000° F., preferably the lower temperatures; (2) A relatively high emissivity—in any event it should remain constant within a small percentage of its nominal value; (3) Ample sighting area—the full target area is a three and one-half inch diameter circle at 12 inches from the lens; other target areas in accordance with the same ratio; (4) Ambient temperature surrounding Radiamatic head always below 120° F. and not subject to rapid fluctuations.

At the left in the accompanying illustration is a device for maintaining constant temperature in the radiation pyrometer, which is shown at the right and bottom of the illustration.

Gem Self-Contained Dust Collectors

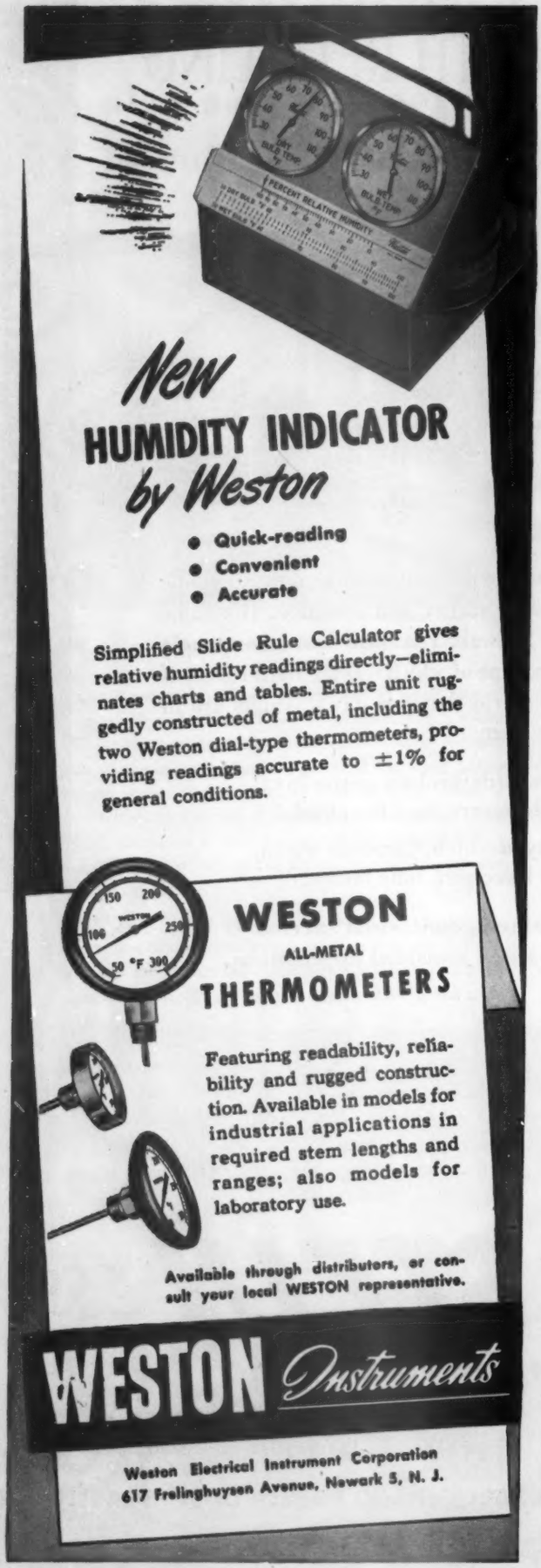
A line of small, portable, self-contained dust collectors, with air capacities ranging from 550 to 1,350 cubic feet of air per minute, is announced by Parsons Engineering Corporation, Cleveland, Ohio. Marketed under the trade-name of "Gem," these new units are available in four sizes and designed to be set close to the source of dust by merely attaching pipe or flexible tube to collector inlet.

Gem dust collectors are said to be applicable for filtering and collecting practically all types of industrial dust such as silica, talc, rubber, starch, iron, feldspar, cement, tobacco, zinc, lead and wood. High efficiency of the units prevents heat loss by returning the filtered air to the room.

One of the new Gem dust collectors available to industry.

Incorporating many features found only in larger duct collecting equipment, this completely packaged Parsons product is recommended specifically for use where no central dust collecting system is available and where the air volume for the proper handling of a dust problem is relatively small.

MUEHLSTEIN • FIRST IN SCRAP RUBBER • MUEHLSTEIN • FIRST IN SCRAP RUBBER • MUEHLSTEIN • FIRST IN SCRAP RUBBER •


New
HUMIDITY INDICATOR
by Weston
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• Convenient
• Accurate
Simplified Slide Rule Calculator gives relative humidity readings directly—eliminates charts and tables. Entire unit ruggedly constructed of metal, including the two Weston dial-type thermometers, providing readings accurate to ±1% for general conditions.
WESTON
ALL-METAL
THERMOMETERS
Featuring readability, reliability and rugged construction. Available in models for industrial applications in required stem lengths and ranges; also models for laboratory use.
Available through distributors, or consult your local WESTON representative.
WESTON Instruments
Weston Electrical Instrument Corporation
617 Frelinghuysen Avenue, Newark 5, N. J.

Wills Sub-Zero Tumbler

Sub-zero rotary "dry ice" tumblers are currently being featured by the Wills Rubber Trimming Machine Co., Canton 1, Ohio. The standard model will efficiently handle 400 pounds of rubber together with the required amount of "dry ice" in one batch. Deflashing time depends on the characteristics of compound, thickness and location of flash, plus the amount of "dry ice" used.

The Wills sub-zero tumbler is constructed entirely of steel and cast iron, the drum rolled out of ¼-inch steel plate and the frame consisting of 4-inch H-beams welded together. The freezing drum is insulated with Styrofoam of 2-inch thickness, and the insulation is protected by a sheet metal casing. The entire chassis may be tilted in either direction while in rotation to insure thorough mixing of the "dry ice" with the rubber. The tilting mechanism also permits quick unloading. The loading hopper has a wide mouth to receive material.

The unit is provided with a controlled variable speed. and operates with a 2 h.p. motor, 60-cycle, 220-440 volts. All shafting is carried on oil-sealed ball bearing pillow blocks. The over-all length of the chassis is 84 inches, and the chassis width is 66 inches. The drum is 60 inches long, with an inside diameter of 35½ inches.

FOR FURTHER DETAILS, SEE AD ON PAGE 542

NEWS

HERE'S NEWS!

STABELAN

AN *Exceptional* STABILIZER FOR PVC AND RESIN COPOLYMERS

1 ➡ IMPROVES PRODUCT QUALITY

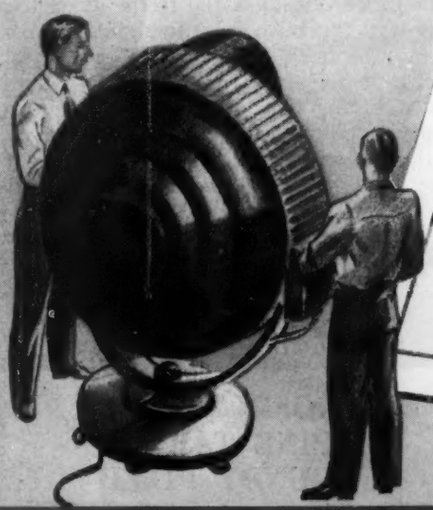
2 ➡ EXTENDS AGING 2 TO 3 TIMES OVER ORDINARY STABILIZERS IN SUNLIGHT, ULTRA VIOLET AND HIGH TEMPERATURE TESTS . . .

HARWICK STANDARD CHEMICAL COMPANY

Has been appointed Sole Sales Distributors by the

STABELAN CHEMICAL COMPANY

Three remarkable types of stabilizers for PVC and Resin Copolymers have been produced under the name of STABELAN . . . Type A for ultra violet and sunlight aging; Type XL for high temperature in processing as well as ultra violet and sunlight aging; and Type G suggested wherever perfect clarity is required as well as for use with organic reds and for high temperature processing, ultra violet and sunlight aging . . . Write for comparative test data.



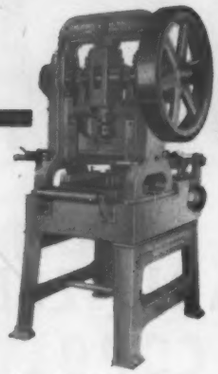
HARWICK STANDARD CHEMICAL CO.

AKRON 8, OHIO

BRANCHES: BOSTON, TRENTON, CHICAGO, LOS ANGELES

Rubber Cutting Machines with a Lifetime of Uniform Quality

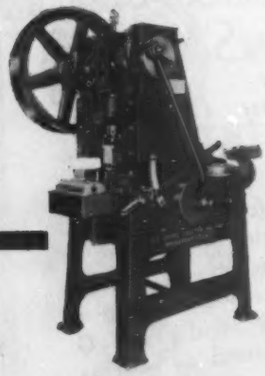
ENGINEERED TO MEET YOUR PARTICULAR REQUIREMENTS



MODEL A2

COULTER RUBBER CUTTING MACHINES have been used successfully for years and years in the cutting of continuous volumetric control and stripping for Heels, Soles, Taps and other molded products.

MODEL A1



- Model A1 for Heels at high speed production, or short runs.
- Model A2 for Multiple Heels, Half and Full Soles with stock grain.

MODEL A3

- Model A3 for Multiple Heels and Taps with or across stock grain.
- Model A2S (Not shown) for cutting crosswise of grain of stock.

PRODUCTION MACHINES SINCE 1896

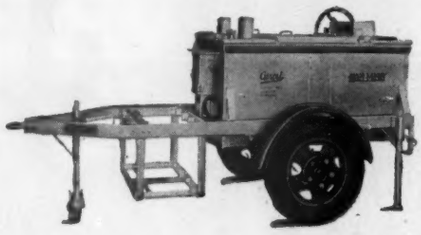
The James COULTER Machine Co.

BRIDGEPORT • CONNECTICUT • U.S.A.

Heet-Master Double-Vat Kettle

To meet the heating and melting problems introduced by new types of rubberized asphalt joint sealing compounds, the Heet-Master Double-Vat Kettle Model 120-DVP has been designed and produced by the Aeroil Products Co., West New York, N. J.

This new unit, it is claimed, differs completely from all other previously known types of asphalt melting



kettles and from the original complicated machines used for the heating and melting of these new rubberized asphalts. It uses a double boiler heating principle to provide uniform thermostatically controlled indirect heating that is absolutely essential before application of all rubberized asphalt joint sealing compounds and has no engines, pumps or other similar mechanical equipment needing skilled operators and constant maintenance.

Through an ingenious grouping of patented engineering and heating methods, the new Model 120-DVP not only brings uniform heat to the compound from the sides and bottom of the kettle, but also from within the melting compound itself. To keep this uniform heat at the exact temperature required by the particular compound being used, a new type of valve, designed during the war for use on big Army bombers, has been adapted to permit the use of thermostatic controls on this kettle. It is claimed that this is the first practical application of automatic finger-tip temperature controls of this type on portable asphalt melting equipment. This means that once having lit the burners on the kettle, the operator then need only turn a knob dial to the exact temperature required and the burners automatically go on and off as heat may be needed to keep the melted material at the exact heat necessary for best operation.

In addition to satisfying the unusual heating requirements of these new compounds, the Aeroil Model 120-DVP features the patented Heet-Master principle of heating from the inside within a fully insulated kettle.

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For RUBBER
From the Pine Tree

ROSIN OIL
PINE TAR
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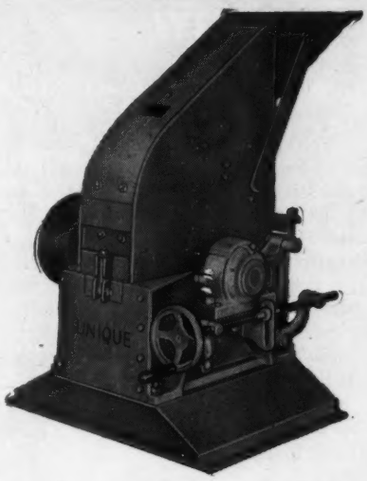
HAMMER MILLS



Continuous full capacity production. Hard iron, interchangeable grinding plates. Self-aligning bearings. Automatic electro-magnet separator prevents tramp metals from entering grinds. Sturdy construction. Designed by experienced engineers whose reputation is founded upon doing things right. Literature available. Inquiries invited.

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RUBBER PEPTIZING AGENT
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- ★ **Shortens Breakdown Time**
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Rubber-wise men Specify the BLACK ROCK 4 KBW
HYDRAULIC RUBBER BALE CUTTER

CHECK THESE ADVANTAGES:

- Safety Feature: Knife Can Be Stopped and Reversed At Any Point in Its Cycle
- Cuts Various Shaped Bales of Smoked Sheets, Crepes, Balatas, Paras, etc.
- Opening Under Knife Is 30" Wide by 20" high*
- No Water or Other Cutting Lubricant Necessary

Special Feed and Take-Off Conveyors, Mechanical or Hydraulic, Can Be Supplied in Place of Manually Operated Feed Device Shown.

Rigid Construction — Trouble Free Operation

Our Engineering and Shop Facilities Are Available for Consultation and Development Service

Front View

Rear View:
shows manually operated stock feeding device as well as operating controls.

WRITE FOR FULL PARTICULARS

*4 KBWX has opening of 45" wide by 36" high

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Test RUBBER PRODUCTS

—for WEATHERING and FADING with

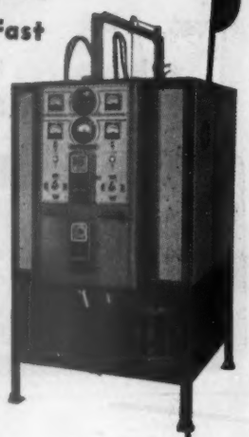
ATLAS-OMETERS

Twin-Arc WEATHER-OMETER

Tests Results Twice As Fast

The new Atlas Twin-Arc Weather-Ometer has been developed to save time where speed in testing is essential.

Where Federal Specifications call for a definite number of testing hours in the Atlas single arc Weather-Ometer, this time can be cut in half in the Atlas Twin-Arc.

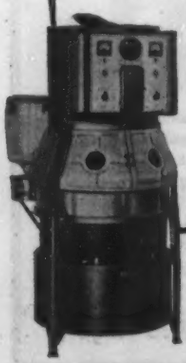


Exclusive Atlas Twin-Arc Weather-Ometer features:

1. Temperature control.
2. Unlimited range and control of Light and Water Spray Periods.
3. Adjustable and automatic timing.
4. Insulated test chamber.
5. Operates continuously 24 hours without manual attention.
6. Carbon cost 28c per day.
7. Full automatic—Safe to operate unattended overnight.
8. Control panel contains Volt and Ammeters — Time Meter—Light and Water Cycle switch—Automatic time cut off switch — Voltage adjusting switch — Direct reading thermal regulator — Reactance Coil (cut power cost in half).

The Single Arc Model is a popular machine where high speed is not required.

FADE-OMETER



The recognized standard machine of the textile trade for determining the light-fastness of materials. Specimens are rotated around the Atlas Enclosed Violet Carbon Arc—the closest approach to natural sunlight. Temperature of the filtered air is automatically controlled. Proper humidity is furnished by evaporation from a constant-level water reservoir. Available with a wide variety of specimen holders and exposure masks.

● Originators and sole manufacturers of accelerated testing devices for a quarter of a century. Fade-Ometer, Weather-Ometer, Launder-Ometer are used all over the world as accepted standard testing machines.

ATLAS ELECTRIC DEVICES CO.
361 West Superior Street, Chicago 10, Illinois

REVIEWS

BOOKLETS, CATALOGS, etc.

The Uses of Hevea for Food in Relation to its Domestication. By Russell J. Seibert. Reprinted from the Annals of the Missouri Botanical Garden, 2315 Tower Grove Ave., St. Louis 10, Mo. 7 x 10½ in. 8 pp.

This interesting pamphlet raises the question as to how the Hevea tree became domesticated. In a consideration of all the factors involved, the author maintains that the domestication of a semi-wild Hevea as a food source, must also be taken into consideration. The pamphlet states that the presence of the tree in a great degree of variability, testifies to its use as a food plant by natives in South America. The author further states that the use of the Hevea seed has not as yet been fully exploited, and could readily be used as stock feed, as well as in industry.

●

PF Decals. Palm, Fechteler & Co., 220 West 22nd St., New York 18, N. Y. 8½ x 11 in. 16 pp.

Designed to promote decalcomanias made by the company, this booklet imparts useful advertising information about this widely used medium—the decal. eFatures of the decals discussed in the booklet include their use for identification, for decorative purposes, for instructional purposes, and more. Six types of Palm, Fechteler decals are described and illustrated: Novars, permanent name plates; Eversticks, for difficult surfaces; Engradals, for decorative purposes; Translacs, for point-of purchase advertising; Syntrans, for use on trucks, trains, etc.; and Special Purpose, two sided decals for use on doors and windows.

●

Yale Load King Scales. The Yale & Towne Mfg. Co., 4530 Tacony Street, Philadelphia 24, Penna. 8½ x 11 in. 68 pp.

Representing a series of six individual bulletins, bound in one volume, this over-all publication discusses dial scale applications as offered to industry by the company. Some of the scales outlined in the bulletins are the counting scale, bench and portable platform models, dormant platform models, crane scales and others. Dimensional drawings and capacity tables are included. Specification information is provided in all instances in tabular form, and there are many photographs of the different scales in their various uses.

●

Blends of Philblack O and Philblack A in Low Cost Natural Rubber Tire Treads. (Bulletin No. 13). Rubber Chemicals Division, Phillips Petroleum Co., Akron, Ohio. 8½ x 11 in. 8 pp.

One of a series of bulletins describing the use of the company's carbon blacks in various compounds, this bulletin discusses the use of blends of Philblack O and A in different natural tire tread stocks. Physical data tables which compare the use of Philblacks with channel black in these compounds is included. Standard information as to tensile, hardness, gravity, elongation, etc., of the different test recipes is also included.

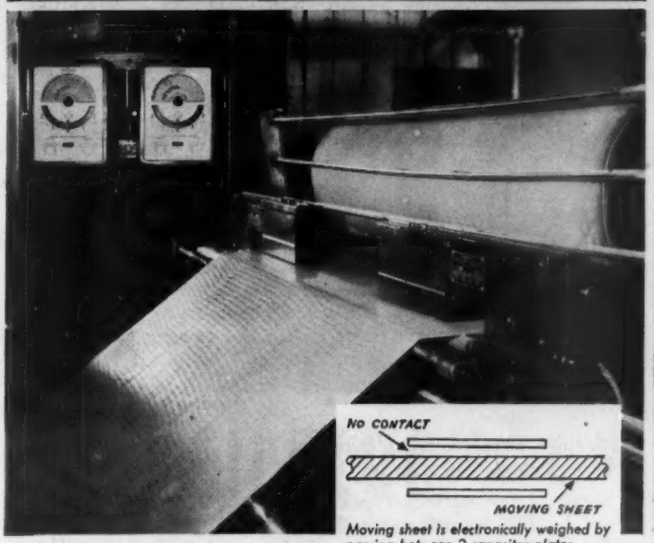
●

Electromatic Testing Machine. (Bulletin No. 37). Tinius Olsen Testing Machine Co., Easton Rd., Willow Grove, Penna. 8½ x 11 in. 4 pp.

This bulletin provides a discussion of the Olsen company's new electromatic testing machine as to specifications, capacities and use. Photographs are included which illustrate the various features of the testing machine, and the manner in which the operator may control the different operations.

Continuously! Electronically!

WEIGHS SHEET STOCK WITHOUT CONTACT



Moving sheet is electronically weighed by passing between 2 capacitor plates.

This Unique System automatically and continuously weighs calendered sheeted material in process . . . indicates instantly any variation in weight of material passing through measuring heads . . . and records weight in ounces per square yard or other suitable units.

By taking advantage of electronic principles, the Verigraph head measures without contacting material. Errors due to speed, surface irregularities and penetration of contacting-type measuring elements are eliminated.

This Foxboro Verigraph Recording System is used on rubber and plastic sheeting by such leading companies as Goodrich, Goodyear, Firestone, General, U. S. Rubber, and Dow Chemicals. It reduces rejects, improves uniformity, and can save tons of material annually. Write for Bulletin No. 234. **The Foxboro Company, 256 Neponset Ave., Foxboro, Mass., U. S. A.**

An exclusive Foxboro development, the Verigraph Weight Recorder applies the speed and sensitivity of electronics to weight recording. Simple to install and operate. Used by leading companies on critical calendering since 1926!

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VEGETABLE OILS

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Types, grades and blends for every purpose, wherever Vulcanized Vegetable Oils can be used in production of Rubber Goods—be they Synthetic, Natural, or Reclaimed.

A LONG ESTABLISHED AND PROVEN PRODUCT

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1903
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A Light Color, Low Density Reinforcing Agent

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Imparts Properties You Want

FOR SOLES AND HEELS—X43 imparts hardness with stiffness while improving flex life and abrasion resistance.

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The Neoprene Latices. (Report No. 48-1). By E. P. Hartsfield and J. R. Galloway. Rubber Chemicals Division, E. I. du Pont de Nemours & Co., Inc., Wilmington 98, Del. 6 x 9½ in. 8 pp.

Brief descriptions of the properties and uses of currently manufactured neoprene latices are given in this technical report. Some of the different types discussed include those suitable for adhesives, saturants, foam sponge, and a wide range of dipped, coated and molded latex products. Characteristics of the neoprene latices are furnished in tabular form, including specific gravity, initial pH, storage stability, mechanical stability, odor and color. Physical properties of neoprene latex films, including tensile and elongation, are also given.

•

The First Ten Years. Manchester Oil Refinery, Ltd., 10 Dover St., London W. 1, England. 7 x 9 in. 32 pp.

Published to mark the completion of 10 years of oil refining operations in Great Britain, this booklet describes in considerable detail the refinery operated by the company in Manchester. Photographs are liberally used to depict the various operations of the refinery, regarded as one of the finest in England. The numerous products of the refinery are shown in flow chart form, as are the vacuum distillation, solvent extraction and de-waxing, and chemical treatment units.

•

Hydraulic Presses. (Bulletin No. 350). Erie Foundry Co., Erie, Penna. 8½ x 11 in. 16 pp.

Some of the various types of hydraulic presses manufactured by the company are described and illustrated in this bulletin. Presses discussed include multiple-opening platen presses of the strain plate type and the strain rod type, self-contained forming presses, mechanical goods presses, extrusion presses, molding presses and special purpose presses. A section of the bulletin is devoted to photographs which show the company's presses at work in some of the largest rubber companies.

•

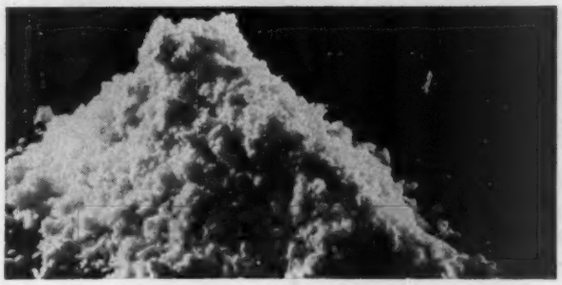
Dow Corning Silicone Mold Release Agents. Dow Corning Corp., Midland, Mich. 8½ x 11 in. 16 pp.

Information on the general properties of the company's silicone mold releasing agents is presented in this pamphlet, as well as major applications in the fields of lubricating tire molds, and curing bags, and in the lubrication of molds for mechanical rubber goods, floor tile, and plastics. Several photographs illustrate procedures in application of the silicones.

FOR FURTHER DETAILS, SEE AD ON PAGE 542

Rayco Fillers

For Non-Marking Sole Compounds



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Early in our pioneering efforts as flock producers, we recognized that the special needs of the Rubber Industry call for a special group of fillers. Here in "Filfloc" is a product developed specifically to enhance strength, as well as impart non-marking qualities. Through experience and joint research with you, we furnish various types of "Filfloc" to meet EXACTLY your needs for compounding crude, synthetic or reclaim.

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fill it out and return it to us.

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Take advantage of this intelligent modern approach to an old problem.

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in VINYL COMPOUNDS with

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VINYLUM No. 45

•

VINYLUM #45, a masterbatch of aluminum powder and vinyl copolymer, permits the production of metallic and iridescent lusters in vinyl products with *uniform color intensity.*

VINYLUM #45 utilizes a special vinyl copolymer, a dispersing agent of unusual efficiency, and ultra-fine polished aluminum powder. The combination is completely compatible with vinyl resins and plasticizers, doesn't materially alter either the processing characteristics of the compound to which it is added or physical properties, such as, tensile strength and tear resistance.

VINYLUM No. 45 is

- **EFFECTIVE** . . provides uniform coloring throughout the mass. No streaking, separating or clustering.
- **ECONOMICAL** . eliminates the 10% to 15% dust loss occurring when ordinary aluminum powder is used.
- **CLEAN** . . . . . eliminates dust contamination of plant and equipment.
- **TIME-SAVING** . reduces substantially the time required to incorporate aluminum powder.

Write for samples and other data to

ARGUS
CHEMICAL LABORATORY
INC.
56 Clifton Place Brooklyn 5, N. Y.

Comparison of Calcene T, Thermax and P-33 in Natural Rubber. (Columbia Pigments Data Sheet No. 48-1). Columbia Chemicals Div., Pittsburgh Plate Glass Co., Pittsburgh, Penna. 8½ x 11 in. 12 pp.

This pamphlet represents a compilation of test data and a discussion on the comparison of Calcene T as a replacement for Thermax and P-33 carbon blacks where light colored natural rubber stocks are desired. Test stocks were mixed and cured according to conventional practice. Results as to stress-strain, tear resistance, hardness, and permanent set were determined according to A.S.T.M. specifications. The pamphlet is illustrated with tables and graphs.

•

Plastics, Molded-Laminated. (Bulletin No. CDP-578). Plastics Division, General Electric Co., Pittsfield, Mass. 8½ x 11 in. 16 pp.

This bulletin is devoted to a description of the design, mold-making, and molding facilities of the G-E Plastics Division and discusses the company's sealing caps and sleeves, mycalex, silicone rubber, and G-E 1422 high frequency insulation. High and low pressure laminates are summarized along with G-E silent gears, bearings, decorative surfaces, translucent sheets, and name plate materials. Property tables are included for handy reference.

•

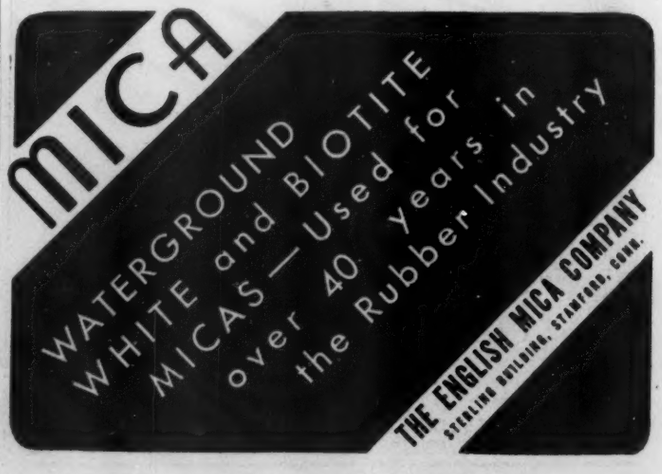
Baldwin Stress-Strain Recorder and Strain Followers. (Bulletin 262). The Baldwin Locomotive Works, Philadelphia 42, Penna. 8½ x 11 in. 32 pp.

The basic principles of the various types of Baldwin recorders are outlined in this bulletin, which gives the distinguishing features of 24 different recorders for all common makes of testing machines; and describes more than 50 extensometers, compressometers and deflectometers that can be used with the recorders. The bulletin also shows typical stress-strain curves as produced by recorders, and includes common testing accessories, and four types of strain gauges.

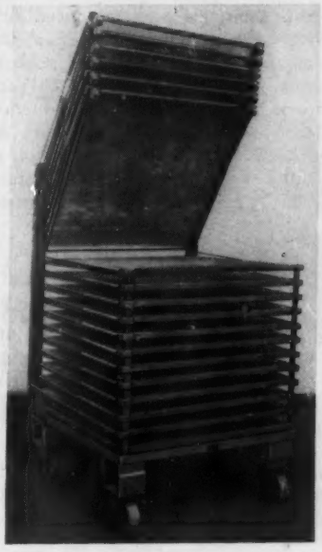
•

Indonex Plasticizers With Various Fillers in Natural Rubber Stocks. (Circular No. 13-25). Chemical Products Department, Standard Oil Co. (Indiana), 910 South Michigan Ave., Chicago 80, Ill. 8½ x 11 in. 6 pp.

This booklet is the latest of a series on Indonex plasticizers and their uses in different stocks. The present study provides a reference as to the use of the plasticizer with various fillers in natural rubber stocks. Several tables indicate test results of formulations in which the plasticizer has been used as to plasticity, tensile, modulus, elongation, hardness, tear, resilience and compression set.



New Stock Cooling Rack



This new Rack gives unobstructed access to three sides of each tray and offers a convenient method for storing materials that require cooling or air drying. Trays are spring supported and can be quickly raised or lowered, free from all locking devices. Racks having 18 perforated trays 36" x 36" or plain surface trays 36" deep by 4 ft., 6 ft. and 8 ft. long, can be furnished either stationary or mounted on casters.

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★ LIBERATES LARGE VOLUME OF GAS ON DECOMPOSITION

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Our products are engineered to fill every need in natural and synthetic rubber compounding wherever the use of vulcanized oil is indicated.

We point with pride not only to a complete line of solid Brown, White, "Neophax" and "Amberex" grades, but also our aqueous dispersions and hydro-carbon solutions of "Factice" for use in their appropriate compounds.

Continuing research and development in our laboratory and rigid production control has made us the leader in this field.

The services of our laboratory are at your disposal in solving your compounding problems.

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DC MOLD RELEASE EMULSION NO. 35

From Akron to Bombay!

Molders of rubber goods in all parts of the world depend upon Dow Corning Mold Release Emulsion No. 35 because this silicone release agent gives them better moldings at lower cost. From tiny grommets to tires taller than a man, floor tile to hot water bottles, crutch tips to valve diaphragms as big as wash tubs, rubber goods of almost every description are easily released from molds that stay cleaner because they are treated with DC Mold Release Emulsion No. 35.

PHOTO COURTESY BALDWIN RUBBER COMPANY

The rubber industry is sold on DC Mold Release Emulsion No. 35 because it is semi-inorganic and does not decompose to form a carbonaceous deposit. It therefore keeps molds clean 5 to 20 times as long according to reports received from the many tire and rubber companies that have been using our emulsion for a period of years. Cleaner molds mean easier release and improved finish.

These are only two of the many advantages realized by manufacturers like the Baldwin Rubber Company of Pontiac, Mich. Baldwin molds such diverse products as mechanical rubber goods for the automotive industry, shoe heels, rubber sole stock, and bicycle seats.

Experience has taught them that the very thin silicone surface formed by spraying molds with a dilute solution of DC Mold Release Emulsion No. 35 gives easy release. This silicone surface adheres to the metal and is not readily picked up by flowing stock. Non-knits, fold-overs and torn heats are therefore practically eliminated.

DC Mold Release Emulsion No. 35 can easily be adapted to your present production layout. Simply dilute the emulsion with 50 to 150 parts of water, depending upon the application, and spray or wipe the mold as often as necessary to maintain easy release.

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REVIEWS (CONT'D)

Comparing Rubbers. By J. F. McWhorter. The Ohio Rubber Co., Willoughby, Ohio. 8½ x 11 in. 8 pp.

The material from which this pamphlet was produced first appeared in the February, 1948, issue of *Machine Design,* and presents in a concise form a comparison of the typical rubbers, both natural and synthetic, now in use with respect to their properties, mechanical applications and economies in production. Engineering drawings, charts, photographs and tables are included. A supplementary section is devoted to the adhesion of rubber to metal. The comparative bonding qualities of natural and synthetic rubbers to different types of metal are discussed.

•

Eriez Permanent Non-Electric Magnetic Equipment. (Catalog No. 12). Eriez Mfg. Co., Erie, Penna. 8½ x 11 in. 8 pp.

Complete specifications regarding weights, sizes and strength comparisons for various types of plate magnets are given in this catalog, as well as tables of operating capacities for permanent magnetic pulleys, drums, pneumatic line assemblies and pipeline traps. All types of magnetic equipment are illustrated through the use of photographs and engineering drawings. Engineering service and laboratory facilities offered by the company, are also discussed.

•

Bausch & Lomb—Photomicrographic Equipment Model L. (Catalog E-210). Bausch & Lomb Optical Co., Rochester 2, N. Y. 8½ x 11 in. 24 pp.

This catalog discusses the general features of the latest in the company's line of photographic microscopy units. Its use for visual and photographic work with transparent or opaque specimens, in high or low powers, is outlined. Tables outline the equipment necessary for any particular industrial task. Photographs showing the Model L Photomicrographic Camera arranged with accessories in use are provided.

•

The Physical Properties of Synthetic Organic Chemicals. (Form 6136). Carbide & Carbon Chemicals Corp., 30 East 42nd St., New York 17, N. Y. 12 pp. 8½ x 11 in.

This booklet, which is a new and revised edition, has been designed as a condensed guide for users of organic chemicals. It contains data on applications and physical properties for more than 185 synthetic organic chemicals. The material is presented in tabular form for ready and easy reference, as to molecular weight, specific gravity, solubility, boiling and freezing points, and more.

FOR FURTHER DETAILS, SEE AD ON PAGE 542

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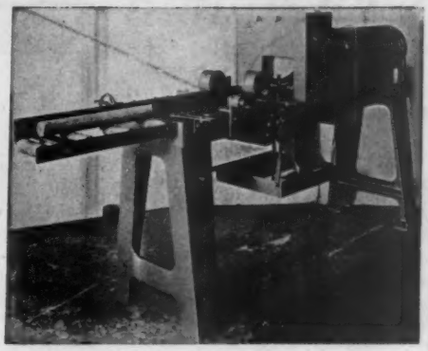

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MARKETS

Rubber – Crude, Reclaimed and Scrap – Cotton – Ducks – Tire Fabrics – Sheetings

NEW YORK, AUG. 11, 1948

Natural Rubber

The price of spot rubber on the Commodity Exchange has swung in a range of 1.25 cents since our last report (July 8), high for the period being 25.00 cents, reached on July 26, 29 and 30, and on August 2, 3 and 9. Low for the period was 23.75 cents on July 9. The average price of spot rubber for the month of July was 24.24 cents based on 21 trading days. This compares with an average of 22.80 cents for the month of June.

According to the U. S. Department of Commerce, foreign demand for new natural and synthetic rubber is now placed at approximately 825,000 long tons, which leaves about 1,175,000 long tons for the U. S. This total, the department says, should satisfy our present stockpiling program as well as the requirements of domestic manufacturers.

The political situation in Malaya and the Far East is generally far from settled. Recent cables have indicated that the political strife will result in curtailed shipments from that area. Rubber shipments from Malaya to Russia during this month may amount to 16,000 tons. Most of this rubber, it is said, is the top grade of Ribbed Smoked Sheet.

Japan is credited with having bought good quantities of rubber from the Dutch East Indies. London sources expect that purchases for Japan from the Dutch East Indies may amount to 25,000 tons by June of next year and in the same period it is expected that some 50,000 tons may be bought from Malaya. This is, of course, well above previous requirements from Japan and also in excess of trade expectations.

Today's quotations in the outside market, London and Singapore, follow:

Outside Market

No. 1 Ribbed Smoked Sheets:	
Spot	.24½
August-September	.24⅜
October-December	.24⅛
Thin Latex Crepe:	
Spot	.25¼
August	.25¼
Thin Brown Crepe, No. 2	.18
Ambers, No. 3	.18
Flat Bark Crepe	.11¾

London Market

(Standard Smoked Sheets)

September	23.10 - 23.40
October-December	23.60 - 23.80

Singapore Market

(Standard Smoked Sheets)

August	22.48 - 22.63

Synthetic Rubber

(Dry Types)

Butaprene NF	.390 - .415
Butaprene NL	.400 - .425
Butaprene NAA	.440 - .465
Butaprene NXM	.470 - .495
Chemigum 30 N4NS	.400 - .470
Chemigum 50 N4NS	.400 - .470
Chemigum N3	.450 - .520
Hycar OR-25	.400 - .425
Hycar OR-15	.470 - .495
Hycar OS-10	.400 - .425
Neoprene Type E	—— - .650
Neoprene Types CG and AC	—— - .500
Neoprene Types FR and KNR	—— - .750
Neoprene Type S	—— - .320
Neoprene Type NC	—— - .250
Perbunan 18	.390 - .415
Perbunan 26	.400 - .425
Perbunan 35	.470 - .495
Thiokol Type A	.370 - .470
Thiokol Type ST	.750 - .850
Thiokol Type FA	.520 - .620
Thiokol PR-1	.750 - .850

Scrap Rubber

Little improvement has been noted in the scrap rubber market during the past few weeks, especially in view of the fact that many rubber plants are shut-down for the usual vacation and inventory periods. Dealers claim, however, that some improvement will be apparent shortly after the Labor Day period. There have been no changes in price quotations. Current quotations follow:

(Prices to Consumers, Delivered Akron)

Mixed passenger tires	ton	$12.00
Beadless truck tires	ton	nom.
Mixed truck tires	ton.	12.00
Beadless passenger tires	ton	nom.
No. 1 passenger peelings	ton	42.50
No. 1 truck peelings	ton	42.50
Red passenger tubes	lb.	.06¼
Black passenger tubes	lb.	.03½
Mixed passenger tubes	lb.	.03¼
No. 2 truck tubes	lb.	nom.
Red truck tubes	lb.	.06
Black truck tubes	lb.	.03
Buffings	ton	15.00

Reclaimed Rubber

Due to the usual summer factory shutdowns for vacations and inventory, the demand for reclaim has fallen off in recent weeks, but is expected to pick up again shortly. Most reclaiming plants are continuing full operations. Consumption of reclaim in June amounted to 23,527 long tons (preliminary), which compares with 21,283 tons in June of last year. Consumption for the first half of the current year amounted to 140,445 long tons. Current quotations follow:

Tires				
Black, Acid	lb.	.08¾	@	.09¼
Black, Digester	lb.	.08	@	.08½
Peels	lb.	.09	@	.09½
GR-S Whole Tire	lb.	.08½	@	.09
Inner Tubes				
Black	lb.	.12¾	@	.13¼
Red	lb.	.13½	@	.14
GR-S	lb.	.09½	@	.10
Butyl	lb.	.08½	@	.09
Shoe				
Unwashed	lb.	.08¾	@	.08¾

Cotton Tire Fabrics

Demand for cotton tire fabrics continues fairly strong as the production of tires, both passenger and truck, continues to exceed all early estimates. Export demand is also apparent, but domestic requirements prohibit large export shipments. No change has been made in the price structure, quotations remaining as follows:

Standard, Peeler, 12/4/2	lb.	.7600
Standard, Peeler, 14/4/2	lb.	.7800
Standard, Peeler, 16/4/3	lb.	.8050
Extra Staple, Peeler, 12/4/2	lb.	.8575
Extra Staple, Peeler, 14/4/2	lb.	.8775
Extra Staple, Peeler, 16/4/3	lb.	.9025

Chafers

14.4 oz. (per sq. yard)	lb.	.7550
9.25 oz. (per sq. yard)	lb.	.7125
11.65 oz. (per sq. yard)	lb.	.6850
8.9 oz. (per sq. yard)	lb.	.7275

Cotton

The price of middling uplands on the Cotton Exchange has swung in a range of 3.45 cents since our last report (July 8), high for the period being 35.65 cents on July 9, and low 32.20 cents on August 10. The average price of middling uplands for the month of July was 34.89 cents based on 21 trading days. This compares with an average of 38.12 cents in June.

The Crop Reporting Board of the Department of Agriculture forecast a surprisingly large cotton crop of 15,169,000 bales on August 9. The crop would be the seventh largest on record, and 3,318,000 bales or about 28% larger than last year's crop. The crop would also be about 3,155,000 bales larger than the ten-year (1937-1946) average.

According to the New York Cotton Exchange Service, the consumption of all cottons in this country during July was 615,000 bales, compared with 801,000 in June and 678,000 in July last year. This was the smallest monthly consumption since July, 1940, when the figure was 565,000 bales. The July figure brought the total consumption for the season to 9,334,000, compared with 10,025,000 bales last year.

The Mexican Government has ordered a temporary embargo on cotton exports until natoinal needs are satisfied. The move, ordered by the Department of National Economy, was taken after complaints from Mexican textile plants that growers are selling abroad rather than on the national market.

Quotations for middling uplands on the Exchange follow:

	July 8	August 11		
	Close	High	Low	Close
October	32.28	31.24	30.95	31.23
December	32.04	31.31	31.03	31.29
March	32.04	31.33	31.06	31.32

Closing Rubber Prices on New York Commodity Exchange

FROM JULY 9 TO AUGUST 11

Date	Spot	Sept.	Dec.	Mar.	May	Sales
July 9	23.75	22.45	22.45	22.40	22.35	74
10	——	——	——	——	——	——
11	——	——	——	——	——	——
12	24.00	22.49	22.49	22.30	22.25	48
13	24.00	22.50	22.45	22.25	22.20	2
14	24.00	22.55	22.56	22.30	22.25	35
15	24.00	22.50	22.55	22.50	22.45	34
16	24.12	22.50	22.60	22.45	22.40	119
17	——	——	——	——	——	——
18	——	——	——	——	——	——
19	24.88	22.95	22.99	22.88	22.83	53
20	24.62	22.85	22.95	22.85	22.80	26
21	24.62	22.70	22.80	22.75	22.70	1
22	24.88	22.70	22.73	22.59	22.54	27
23	24.88	22.60	22.65	22.50	22.45	79
24	——	——	——	——	——	——
25	——	——	——	——	——	——
26	25.00	22.80	22.80	22.75	22.70	31
27	24.88	22.75	22.75	22.70	22.65	37
28	24.88	22.65	22.65	22.60	22.65	147
29	25.00	22.80	22.85	22.70	22.60	65
30	25.00	23.00	23.05	22.88	22.75	86
31	——	——	——	——	——	——
Aug. 1	——	——	——	——	——	——
2	25.00	23.20	23.20	23.10	22.90	18
3	24.88	22.90	22.85	22.75	22.50	22
4	24.75	22.65	22.65	22.55	22.30	85
5	23.75	22.84	22.70	22.70	22.50	37
6	25.00	22.85	22.70	22.60	22.50	34
7	——	——	——	——	——	——
8	——	——	——	——	——	——
9	25.00	22.80	22.70	22.65	22.50	27
10	24.88	22.60	22.50	22.43	22.28	18
11	24.50	22.40	22.35	22.20	22.05	37

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Meticulous workmanship has been a tradition at Brockton Cutting Die for three generations. That's why rubber manufacturers turn to us for quality dies of all kinds . . . for dies that really retain their cutting edge. Our experience and facilities enable us to turn out a cutting die for every type of service.

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A PORTABLE machine capable of stripping slab rubber up to 1" thick at the rate of 20,000 feet in 8 hours. Any width desired.

SPECIAL FEATURES

- Has micro-adjustment for accurate widths.
- Equipped with water tank which feeds water to the slotted knife and to the cut.
- Has repulsion induction motor which carries any overloads.
- Automatic sharpener device keeps knife keen and sharp.
- Has base with rollers and is very easy to handle.

Cuts within 1/64 inch to 1/100 inch tolerance depending on grades of rubber. Cuts a slab down to the last shaving. Cuts all grades of rubber including pure gum, sponge, etc. Cuts squarely—no rejects.

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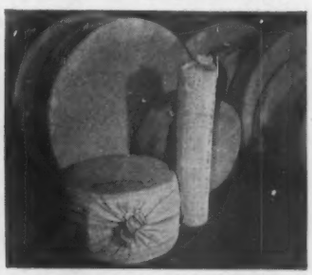

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CURRENT MARKET PRICES

Of Rubber Chemicals and Compounding Ingredients

AUGUST 11, 1948

Prices are, in general, f.o.b. works. Range of prices indicates grade or quantity variations.

Abbreviations: bbls., barrels; c.l., carlot; cyl., cylinder; dlvd., delivered; dms., drums; l.c.l., less than carlot; M.B., masterbatch; min., minimum; ref., refined; sap., saponified; sp., special; syn., synthetic; t.c., tank cars.

[a] East of Mississippi.

—The arrangement of this section follows closely the Chemical Section of the 1947 RUBBER RED BOOK to which readers are referred to determine the classification of any material or brand name.

—Although suppliers of every material were contacted for price information, only those materials are listed for which quotations have been furnished us. The quotations are not guaranteed and prospective purchasers should contact suppliers for confirmation before placing orders. Suppliers are requested to send us regularly current prices on all of their materials used in the rubber industry.

—All requests for information or listings should be sent to Market Editor, RUBBER AGE, 250 West 57th St., New York 19, N. Y.

ACCELERATORS

A-1	lb.	.34	- .39
A-10	lb.	.40	- .47
A-19	lb.	.52	- .58
A-32	lb.	.59	- .69
A-77	lb.	.42	- .55
A-100	lb.	.42	- .55
Accelerator No. 8 (dlvd.)	lb.	——	- .75
Accelerator No. 49	lb.	.44	- .45
Accelerator No. 89 (dlvd.)	lb.	——	- 1.20
Accelerator No. 122 (dlvd.)	lb.	——	- 1.30
Accelerator No. 552 (dlvd.)	lb.	——	- 1.63
Accelerator No. 808 (dlvd.)	lb.	.59	- .61
Accelerator No. 833 (dlvd.)	lb.	1.13	- 1.15
Acrin (dlvd.)	lb.	——	- .65
Altax	lb.	.35	- .37
Arazate	lb.	——	- 2.16
Beutene	lb.	.59	- .64
B-J-F	lb.	.27	- .32
Butasan	lb.	——	- 1.00
Butazate	lb.	——	- 1.00
Butyl Eight	lb.	1.00	- 1.05
Captax	lb.	.27	- .29
C-P-B	lb.	——	- 1.95
Cumate	lb.	——	- 1.45
Cuprax	lb.	.60	- .62
Dibenzo G-M-F	lb.	——	- 2.65
Diorthotolylguanidine (dlvd.)	lb.	.48	- .50
Diphenylguanidine (dlvd.)	lb.	.39	- .45
El-Sixty	lb.	.39	- .46
Ethasan	lb.	——	- 1.00
Ethazate	lb.	——	- 1.00
Ethyl Thiurad	lb.	——	- 1.00
Ethyl Tuex	lb.	——	- 1.00
Formaniline (dlvd.)	lb.	——	- .40
G-M-F	lb.	——	- 2.50
Good-rite Erie	lb.	.31	- .33
Guantal	lb.	.47	- .54
Hepteen	lb.	.42	- .48
Base	lb.	1.80	- 1.90
Ledate	lb.	——	- 1.00
Mercaptobenzothiazole	lb.	.27	- .32
Mercaptobenzothiazyl Disulfide	lb.	.35	- .40
Methasan	lb.	——	- 1.00
Methazate	lb.	——	- 1.00
Monex	lb.	——	- 1.10
Mono Thiurad	lb.	——	- 1.10
Morfex 33	lb.	.53	- .58
2-MT (dlvd.)	lb.	.58	- .60
Novac	lb.	——	- 1.40
A-13	lb.	.65	- .67
O-X-A-F	lb.	.34	- .39
Pentex	lb.	.74	- .84
Flour	lb.	.12¼	- .13¼
Phenex (tons)	lb.	——	- .40
Pipazate	lb.	——	- 1.53
Pip-Pip	lb.	——	- 1.63
R-2 Crystals	lb.	——	- 1.55
Rotax	lb.	.39	- .41
SA 52	lb.	——	- 1.10
SA 57	lb.	——	- 1.00
SA 62	lb.	——	- 1.00
SA 66	lb.	——	- 1.45
SA 67	lb.	——	- 1.00
SA 77	lb.	——	- 1.00
Safex	lb.	——	- 1.15
Santocure	lb.	.53	- .60
Selazate	lb.	——	- 1.45
Selenac (Ethyl, Methyl)	lb.	——	- 1.45
Setsit-5	lb.	.75	- 1.00
SPDX-GH (tons)	lb.	.64	- .69
Tellurac	lb.	——	- 1.45
Tepidone (dlvd.)	lb.	——	- .55
Tetrone (dlvd.)	lb.	——	- 1.25
A (dlvd.)	lb.	——	- 1.85
Thiocarbanilide (dlvd.)	lb.	——	- .34
Thiofide	lb.	.35	- .42
Thionex (dlvd.)	lb.	——	- 1.10
Thiotax	lb.	.27	- .34
Thiurad	lb.	——	- 1.10
Thiuram E (and M) (dlvd.)	lb.	1.00	- 1.10
Trimene	lb.	.54	- .64
Base	lb.	1.03	- 1.18
Triphenylguanidine (dlvd.)	lb.	——	- .83
Tuads (Ethyl, Methyl)	lb.	1.00	- 1.10
Tuex	lb.	——	- 1.10
Ultex (tons)	lb.	——	- 1.00
Unads	lb.	——	- 1.10
Ureka	lb.	.55	- .62
Blend B	lb.	.55	- .62
C	lb.	.52	- .59
Vitasan Crystals	lb.	.48	- .53
Vulcanex (dlvd.)	lb.	——	- .45
Z-B-X	lb.	——	- 2.45
Zenite (dlvd.)	lb.	.33	- .35
A (dlvd.)	lb.	.42	- .44
B (dlvd.)	lb.	.39	- .41
Zenite Special	lb.	.34	- .36
Zetax (coated)	lb.	.33	- .35
(uncoated)	lb.	.34	- .36
Zimate (Butyl, Ethyl)	lb.	——	- 1.00
Zimate, Methyl	lb.	——	- 1.00

ACTIVATORS

Blue Lead, Sublimed (dlvd.)	lb.	.15¼	- .15½
Fish Oil, Hydrogenated, Fatty Acid			
Hydrofol Acid (dlvd.)	lb.	.22¾	- .26¼
Hyfac 430 (dlvd.)	lb.	.25	- .26
Neo-Fat H.F.O. (dlvd.)	lb.	.27	- .28
Stearex Beads (dlvd.)	lb.	.28	- .29½
Lime, Hydrated			
Arrowhead	ton	16.00	- 19.50
Sierra	ton	16.00	- 19.50
Litharge			
Eagle (dlvd.)	lb.	.1925	- .2025
FBS (dlvd.)	lb.	.1935	- .2035
Magnesium Oxide, Heavy			
General Magnesite	lb.	.05½	- .08
Michigan No. 15	lb.	.0550	- .0600
Permanente	lb.	.05	- .06½
Magnesium Oxide, Light			
Baker's (Neoprene Grade)	lb.	——	- .28
General Magnesite (Neoprene Grade)	lb.	——	- .28
General Magnesite No. 101	lb.	——	- .175
General Magnesite Standard	lb.	——	- .22
K & M (Neoprene Grade)	lb.	——	- .28
Maglite "M" (l.c.l.)	lb.	——	- .28
Marine's (Neoprene Grade (l.c.l.)	lb.	——	- .28
Michigan No. 30	lb.	——	- .22½
No. 40	lb.	——	- .2800
Witco Extra Light	lb.	.25	- .27
Oleic Acid			
Emersol 210 (dlvd.)	lb.	.20½	- .22¾
L.C.P. Red Oil	lb.	.25½	- .27¼
Red Oil (20-24 Saponified) (dlvd.)	lb.	.30½	- .32¾
Palm Oil Fatty Acid (c.l.)	lb.	——	- .11

ACTIVATORS (Cont'd)

Potassium Oleate (drums)	lb.	——	- .29½
Red Lead			
No. 2 RM (dlvd.)	lb.	.2075	- .2175
Sodium Laurate (drums)	lb.	——	- .19
Sodium Oleate—Powder (drums)	lb.	——	- .35
Paste (drums)	lb.	——	- .20
Sodium Stearate—Powder (drums)	lb.	——	- .35
USP Grade (drums)	lb.	——	- .37
Stearic Acid, Single Pressed			
Emersol 110 (dlvd.)	lb.	.27½	- .28½
Stearex B (dlvd.)	lb.	.31½	- .32½
Stearic Acid, Double Pressed			
Alba (dlvd.)	lb.	.33¾	- .34¾
S-2-A (dlvd.)	lb.	.31½	- .32½
S-2-B (dlvd.)	lb.	.31	- .32
Stearic Acid, Other			
Neo-Fat 1-60 (dlvd.)	lb.	.29	- .30
Neo-Fat 1-65 (dlvd.)	lb.	.30	- .31
Stearite	cwt.	36.00	- 38.00
White Lead Carbonate (dlvd.)	lb.	.19	- .20
Zinc Laurate (c.l.)	lb.	——	- .29
Laurex	lb.	.32	- .35
Zinc Stearate	lb.	.51	- .52
Aquazinc	lb.	.20	- .35

Unclassified Activators

Actifat (dms.)	lb.	——	- .18
Acidex	lb.	.09	- .15
Aero Ac 50	lb.	.50	- .56
165	lb.	.37	- .39
Barak (dlvd.)	lb.	——	- .60
D-B-A	lb.	——	- 1.95
Delac J	lb.	.55	- .60
P	lb.	.45	- .52
Dibutylamine (l.c.l., dms.)	lb.	——	- .53½
Dutch Boy Normasal	lb.	——	- .43¼
Palmalene (drums)	lb.	——	- .15
Plastolein 9050 (dms.)	lb.	.55¼	- .57½
9055 (dms.)	lb.	.45¾	- .48
9058 (dms.)	lb.	.55¼	- .57½
9250 (dms.)	lb.	.35¼	- .37½
9715 (dms.)	lb.	.41¾	- .44
Polyac (dlvd.)	lb.	——	- 1.40
Ridacto (drums)	lb.	.22	- .24
Snodotte (dlvd.)	lb.	.24½	- .25½
SOAC (min. 10 dms.)	cwt.	——	- 10.00
SOAC-KL (min. 10 dms.)	cwt.	——	- 10.00

ANTI-COAGULANTS

Anhydrous Ammonia (l.c.l.)	lb.	.02½	- .02¾
National (cyl., dlvd.)	lb.	.16	- .20
Aqua Ammonia (l.c.l., dms.)	lb.	.0285	- .0325
M.B.M. (l.c.l.)	lb.	——	- .35

ANTI-FOAMING AGENTS

Aero Anti Foam H	lb.	——	- .12
Regular	lb.	——	- .08½

ANTI-OXIDANTS

Agerite Alba	lb.	2.20	- 2.30
Gel	lb.	.58	- .60
Hipar	lb.	.82	- .84
H. P.	lb.	.61	- .63
Powder	lb.	.46	- .48
Resin	lb.	.63	- .65
Resin D	lb.	.46	- .48
Stalite	lb.	.46	- .48
White	lb.	1.40	- 1.50
Akroflex C (dlvd.)	lb.	.58	- .60
Aminox	lb.	.46	- .55
Aranox	lb.	——	- 2.15
Benzoquinone	lb.	1.50	- 1.75
Betanox Special	lb.	.68	- .77
B-L-E	lb.	.46	- .55
Powder	lb.	.61	- .63
B-X-A	lb.	.43	- .45
Carvacrol	lb.	——	- .85
Chlorcarvacrol	lb.	——	- 2.45
Eugenol C-95%	lb.	1.40	- 1.80
Flectol H	lb.	.46	- .53
Flexamine	lb.	.61	- .70
Gallic Acid, Tech.	lb.	1.10	- 1.23
USP or NF	lb.	1.27	- 1.40
Hydroquinone	lb.	.90	- .90
Monomethylparaminophenol Sulfate	lb.	2.40	- 2.90
Neozone Standard (dlvd.)	lb.	.66	- .68
A (dlvd.)	lb.	.43	- .45
C (dlvd.)	lb.	.47	- .49
D (dlvd.)	lb.	.43	- .45

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POLYCO 296

SYNTHETIC THICKENER FOR LATICES AND RESIN EMULSIONS

Manufacturers, compounders and consumers of natural and synthetic latices frequently ask us, "Do you have a stable, non-creaming thickener for our emulsions which will give us high viscosities at low concentrations?" Until recently, this perennial problem has been one of the banes of our existence. Now, we are pleased to announce the answer to this problem — POLYCO 296, a synthetic high polymeric thickening agent.

COMPOSITION:
POLYCO 296 is an aqueous solution of the sodium salt of an acrylic acid copolymer.

SPECIFICATIONS:

Concentration	15%
Color	Slight yellow
Turbidity	Slightly cloudy
Viscosity	Over 100,000 cps. @ 25°C
pH	8-9

GENERAL PROPERTIES:
POLYCO 296 can be diluted with hot or cold water to yield solutions with higher viscosities than those obtained with most commercially available synthetic thickeners. Derived solely from synthetic materials, POLYCO 296 is not subject to the rotting, souring and mildewing commonly encountered with naturally derived gums, proteins and starches.

POLYCO 296 by itself yields tough, elastic, acid-resistant films which do not embrittle or yellow with age. Because of the small quantities of this material required for effective thickening of most latices, film properties of such latices are not significantly altered.

COMPATIBLE WITH:
GRS Latex
Natural Latex
Hycar Latex
Neoprene Latex
Many other Latices and Resin Dispersions

ADVANTAGES:
Heat stable — will not gel at high temperatures.
High viscosities at low concentration.
Non-oxidizing, non-yellowing, flexible films.
Non-creaming, mechanically stable compounds with latices and emulsions.
Resistant to oils, fats, greases and aliphatic solvents.
Will not support bacterial growth.

SUGGESTED USES:
1. To thicken latices for dipping, saturating and coating operations.
2. Flexible film former on paper, leather and plastic films.
3. Protective colloid for emulsions and dispersions.
4. Grinding medium for pigments.
5. Addend to emulsions paints.
6. Vehicle for textile printing pastes

Write for generous working samples and additional information.

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ANTI-OXIDANTS (Cont'd)

Oxidex	lb.	——	3.40
Parazone (dlvd.)	lb.	——	.68
PDA-10	lb.	.36	.38
Perflectol	lb.	.61	.68
Permalux (dlvd.)	lb.	1.53	1.55
Pyrogallic Acid, Resublimed.	lb.	2.60	2.65
USP Crystals	lb.	2.10	2.15
Resorcin, Tech. (dlvd.)	lb.	——	.64
Santoflex B	lb.	.46	.53
BX	lb.	.57	.64
Santovar-A	lb.	1.30	1.37
Santowhite (crystals)	lb.	1.73	1.80
Santowhite MK	lb.	1.40	1.52
MKS	lb.	1.25	1.37
S.C.R. (tons)	lb.	.32	.34
Solux (dlvd.)	lb.	1.93	1.95
Stabilite (tons)	lb.	——	.46
Alba (tons)	lb.	——	.69
L (tons)	lb.	——	.48
Stabilizer No. 1	lb.	1.55	2.05
Stabilizer No. 320	lb.	.75	1.25
Tannic Acid, Tech.	lb.	.70	.79
Thermoflex (dlvd.)	lb.	1.48	1.50
A (dlvd.)	lb.	.76	.78
C (dlvd.)	lb.	.54	.56
Thymol	lb.	——	2.50
V-G-B	lb.	.55	.64

ANTI-SCORCHING AGENTS

Good-rite Vultrol	lb.	.55	.57
Retarder W (dlvd.)	lb.	——	.43
Sodium Acetate 60-62% Crystals	lb.	——	.05½

ANTISEPTICS AND GERMICIDES

Formaldehyde (barrels)	lb.	——	.062
G-4 (bbls.)	lb.	——	1.00
G-11	lb.	——	3.50
Methyl Para Hydroxy Benzoate	lb.	——	2.10
Nuodex 100 S.S. (dlvd.)	lb.	——	1.05
Nuodex 100 W.D. (dlvd.)	lb.	——	1.20
Nuodex Zinc 8% (dms.) (dlvd.)	lb.	——	.2125
Ortho Cresol (26°-27°)	lb.	——	.18
Soligen Drier—Copper 8% (drums)	lb.	——	.22½
Zinc 8% (dms.)	lb.	——	.21¼
Vancide	lb.	——	.80

AROMATICS (DEODORANTS)

Bouquet 149	lb.	——	3.00
Coumarin	lb.	——	2.75
Curodex 19	lb.	——	4.75
188	lb.	——	5.75
198	lb.	——	6.75
D-6 Masking Perfume	lb.	——	1.35
Deodorant 65	lb.	——	1.00
Deodorant L-37	lb.	2.00	2.40
L-44	lb.	2.50	2.90
N.L.T.X.	lb.	1.85	2.15
Latex Perfume 5	lb.	——	3.25
6	lb.	——	7.50
9	lb.	——	.65
Neutroleum Delta	lb.	——	2.40
Gamma	lb.	——	3.40
Parador A	lb.	2.00	2.50
B	lb.	.65	1.00
C	lb.	2.75	3.25
D	lb.	1.50	2.00
E	lb.	.25	.75
GD 5280	lb.	2.00	3.50
GD 5348	lb.	1.90	3.25
Perfume Oil Bouquet Vanilla M	lb.	2.40	2.75
Rodo No. 0	lb.	4.00	4.50
No. 10	lb.	5.00	5.50
Rubbarome (dms.)	lb.	1.10	2.10
Rubber Perfume 12	lb.	——	1.90
Russian Leather 7	lb.	——	4.10
Vanillin	lb.	3.00	3.15

BLOWING AGENTS

Ammonium Bicarbonate (dlvd.)	lb.	.0640	.0975
Blowing Agent CP-975	lb.	——	.50
Sodium Bicarbonate, U.S.P. (c.l., bags)	cwt.	——	1.85
Sponge Paste	lb.	——	.20
Unicel (dlvd.)	lb.	——	.60
ND (dlvd.)	lb.	——	1.00
Urea	lb.	.0425	.0475

BONDING AGENTS

Durez 12987	lb.	.48	.53
Interlake Resin No. 4162	lb.	——	1.50
MDI	lb.	7.25	7.75
50	lb.	3.60	3.85
Pliobond 20	gal.	2.75	4.00
30	gal.	3.45	4.70
Reanite	gal.	6.75	7.25
Rex Compound 482	gal.	——	1.05
Ty-Ply Q (and S)	gal.	6.75	8.00

COAGULANTS

Acetic Acid—56% (bbls.)	cwt.	8.11	8.61
Glacial—99½% (bbls.)	cwt.	14.05	14.55
Calcium Nitrate, Tech., Crystals	lb.	.12½	.15
Hydroxyacetic Acid—70% (dms.)	lb.	——	.084
Zinc Nitrate, Tech.	lb.	——	.21½

COLORING AGENTS

Black

Carbon Black—See *Reinforcing Agents*			
Aquablak B (also M, R)	lb.	.08¾	.09¼
Aquablak S	lb.	.07¾	.08¾
Black Shield 4-35 (dms.)	lb.	——	.0825
Lampblack No. 10	lb.	.06	.09
Mapico Black Iron Oxide (50 lb. bags)	lb.	.0975	.1000
Raven Black Pure Iron Oxide	cwt.	10.75	11.00

Blue

Blue GD, Dispersed (dlvd.)	lb.	——	3.95
Paste (dlvd.)	lb.	——	1.80
Blue N (dlvd.)	lb.	——	.94½
Blue YD, Dispersed (dlvd.)	lb.	——	2.50
Milori Blue 11840 (dlvd.)	lb.	——	.45
Monastral Fast Blue CP (dlvd.)	lb.	——	3.85
PCD, Dispersed (dlvd.)	lb.	——	2.50
Ramapo Blue	lb.	3.40	3.45
Rubber Blue X-1999	lb.	——	1.00
Stan-Tone Blue	lb.	1.40	4.00
Ultramarine	lb.	.14	.30
Vansul Blue M.B.	lb.	1.00	2.45
Victoria Blue BP-262-D	lb.	2.25	2.30

Brown

Brown Iron Oxide	lb.	.1075	.12
Mapico Brown (50 lb. bags)	lb.	——	.1250

Green

Filo Green D-700 (and D-705)	lb.	——	.30
Green Chromium Oxide, Pure	cwt.	33.00	40.00
Green Chromium Oxide, Pure, Hydrated	cwt.	75.00	100.00
Green FD, Dispersed (dlvd.)	lb.	——	1.50
Monastral Fast Green GSD, Dispersed (dlvd.)	lb.	——	3.20
GSD Paste (dlvd.)	lb.	——	1.10
Permansa Green CP-594	lb.	——	1.35
Pigment Green B	lb.	——	1.35
GL-652D	lb.	.88	.93
Ramapo Green	lb.	——	4.00
Rubber Green X-1292	lb.	——	1.00
Stan-Tone Green	lb.	1.50	3.30
Utility Green	lb.	——	.30
Vansul Green M.B.	lb.	.85	2.40

Maroon

Stan-Tone Maroon	lb.	3.00	3.05
Vansul Maroon M.B.	lb.	1.05	2.80

Orange

Molybdate Orange	lb.	——	.41
Orange F (dlvd.)	lb.	——	3.65
FD, Dispersed (dlvd.)	lb.	——	2.75
Rubber Orange X-2065	lb.	——	2.60
Stan-Tone Orange	lb.	1.65	2.25
Vansul Orange M.B.	lb.	2.15	2.65

Red

Cadmium Red	lb.	.95	1.25
Cadmolith Red (bbls.)	lb.	1.10	1.35
Graphic Red (dlvd.)	lb.	——	.80
Indian Red, Pure	cwt.	11.50	11.75
Mapico Red 297 (50 lb. bags)	lb.	.1050	.1075
Oximony Iron Oxide	lb.	——	.09
Red Iron Oxide, Light	cwt.	11.50	11.75
Red PB (dlvd.)	lb.	——	1.90
PBD Dispersed (dlvd.)	lb.	——	1.65
2B (dlvd.)	lb.	——	1.75
2BD, Dispersed (dlvd.)	lb.	——	1.65
Rubanox Red CP-762 (dlvd.)	lb.	——	1.30
Rubber Red CP-339 (dlvd.)	lb.	——	1.05
Rubber Red RT-364	lb.	——	.75
Rubber Red RT-425	lb.	——	.75
Rubber Red X-1148	lb.	——	.80
Solfast Red CP-663 (dlvd.)	lb.	——	1.80
CP-787 (dlvd.)	lb.	——	1.30
Stan-Tone Red	lb.	1.10	3.05
Vansul Red M.B.	lb.	1.00	2.05
Watchung Red	lb.	——	1.90

White—Lithopone

Albalith	lb.	.06⅜	.06⅝
Astrolith	lb.	.06⅜	.06¾
Cryptone No. 19	lb.	.08¼	.08½
CB No. 21	lb.	.08	.08¼
Eagle	lb.	.06⅜	.06⅝
Permalith	lb.	.06	.06¼
Ponolith	lb.	.06⅜	.06¾
Sunolith	lb.	.06⅜	.06¾

White—Titanium Pigments

Rayox	lb.	.17½	.20½
Ti-Cal	lb.	.07	.07½
Ti-Pure	lb.	.20	.21
Titanox A—all grades (dlvd.)	lb.	.17½	.18
B-30 (dlvd.)	lb.	.07	.07½
C (dlvd.)	lb.	.06¾	.07¼
RA—all grades (dlvd.)	lb.	.19½	.20
RC-HT (dlvd.)	lb.	.06¾	.07¼
Zopaque	lb.	.17½	.18½

White—Zinc Oxide (American Process)

AZO-ZZZ 11 (and 22, 33, 44, 55)	lb.	.1100	.1125
Eagle	lb.	.1100	.1125
Horse Head Special	lb.	.1100	.1125
XX Red	lb.	.1100	.1125
Joxite	lb.	.0925	.0975
St. Joe Black Label	lb.	.1100	.1125
Green Label	lb.	.1100	.1125
Red Label	lb.	.1100	.1125

White—Zinc Oxide (Dispersed)

Dispersed Zinc Oxide	lb.	——	.13

White—Zinc Oxide (French Process)

AZO-ZZZ 66	lb.	.1325	.1350
Eagle Green Seal	lb.	.1275	.1300
Eagle Red Seal	lb.	.1225	.1250
Eagle White Seal	lb.	.1325	.1350
Florence Green Seal	lb.	.1275	.1300
Red Seal	lb.	.1225	.1250
White Seal	lb.	.1325	.1350
Kadox 25	lb.	.1325	.1350
72	lb.	.1100	.1125
Black Label	lb.	.1100	.1125
Red Label	lb.	.1100	.1125
U. S. P. 12	lb.	.1425	.1450

White—Zinc Sulfide

Cryptone ZS-800	lb.	.1150	.1175

Yellow

Anchor Brand Pure Iron Oxide	cwt.	9.00	9.25
Cadmolith Yellow (bbls.)	lb.	——	.85
Chrome Yellow	lb.	——	.2950
Chrome Yellow 12310	lb.	——	.2950
Ferrox	cwt.	7.50	8.50
Mapico Yellow (50 lb. bags)	lb.	.0825	.0850
Rubber Yellow X-1940	lb.	——	1.60
Stan-Tone Yellow	lb.	1.20	1.75
Toluidine Yellow	lb.	——	1.70
YL-556-D	lb.	——	.82
Oximony Iron Oxide	lb.	——	.06¾
Vansul Yellow M.B.	lb.	.85	1.00
Yellow G (dlvd.)	lb.	——	1.95
GD, Dispersed (dlvd.)	lb.	——	1.85
HN (dlvd.)	lb.	——	1.60
Zinc Yellow	lb.	——	.21

DISPERSING AGENTS

Agchem SA-19	lb.	——	.30
SA-20	lb.	——	.70
Aqualsol-AR 90%	lb.	——	.24¾
Beaconol 52	lb.	.60	.75
Darvan No. 1 (and No. 2)	lb.	.21	.30
Daxad 11 (21, 23)	lb.	.08	.35
Dilex	lb.	——	.32
Dispersaid	lb.	1.25	1.35
Halloid	lb.	.03¾	.09½
HornKem No. 1	gal.	——	1.60
No. 3G	gal.	——	1.75
No. 12	lb.	——	.17
Lomar PW	lb.	.18	.19
Marasperse CB	lb.	.11½	.15
N	lb.	.09	.10
Rubbex	lb.	——	.27½
Stan-Chem BQC	lb.	.12¼	.17¼
1067	lb.	——	.13½
1471	lb.	.1687	.2187
2251	lb.	.12¼	.17¼
Triethanolamine (drums) (dlvd.)	lb.	.21½	.22½
Triton R-100	lb.	.15½	.25
Yelkin TT	lb.	——	.22
Zinsper	lb.	——	.15

EXTENDERS

Advagum 1098	lb.	——	.65
Bunaweld Polymer No. 780	lb.	——	.22
No. 5514	lb.	——	.30
D-92 (and D-93) (dms.)	lb.	——	.12
Extender 600	lb.	——	.208
PR-162 Latex (dms.)	gal.	1.00	1.60
Synprolac	lb.	——	.19
Synprowax	lb.	.16	.19
Vistanex	lb.	——	.32

FILLERS (Inert and Reinforcing)

Abrasives			
Carbonite	lb.	.15	.95
Lionite	lb.	.09¾	.90
Pumice	lb.	.03	.05
Aluminum Hydrate	lb.	——	.17
Aluminum Silicate			
Silical	ton	37.00	55.00
Marter White	ton	18.50	30.00
Barium Carbonate (i.c.l.)	ton	77.00	85.00
Barytes			
No. 1 Floated, White	ton	33.10	44.55
No. 2 Floated, Unbleached	ton	31.10	41.95
No. 22 Barytes (c.l.)	ton	——	18.37
Foam A	ton	——	33.10
Bentonite (c.l.)	ton	——	11.00
SPV Volclay (c.l.)	ton	——	11.00

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FILLERS (Cont'd)

Blanc Fixe	ton	72.50	-120.00
Calcium Carbonate			
Atomite (c.l.)	ton	——	- 30.00
B.I. White No. 1 (c.l.)	ton	——	- 7.50
B.I. White No. 2 (c.l.)	ton	——	- 7.00
Blue-Star XX	ton	——	- 15.00
Calcene T	ton	45.00	- 55.00
Camelwite	ton	——	- 30.00
Kalite (c.l.)	ton	——	- 40.00
Lesamite (c.l.)	ton	——	- 27.50
Lim-Cal (c.l.)	ton	——	- 12.50
Millical (c.l.)	ton	——	- 25.00
Multifex	ton	——	-105.00
Sierracal	ton	15.00	- 18.50
Super Multifex	ton	——	-145.00
Suspenso (c.l.)	ton	——	- 22.00
Swansdown (c.l.)	ton	——	- 20.00
Witcarb R (c.l.)	ton	——	-105.00
R-12 (c.l.)	ton	40.00	- 60.00
Calcium Silicate			
Silene EF	ton	110.00	-120.00
Calcium Sulfate, Anhydrous			
Snow White Filler	ton	——	- 18.00
Calcium Sulfate, Hydrous			
Crysta-Cal (c.l.)	ton	——	- 12.50
Terra Alba No. 1	ton	12.00	- 14.40
Chalk Whiting (l.c.l.)	lb.	.0150	- .0175
Recco Paris Whiting	ton	——	- 27.00
Clay			
Alsite (c.l.)	ton	——	- 13.00
Aluminum Flake	ton	16.50	- 60.00
A.S.P. No. 1 (c.l.)	ton	——	- 35.00
No. 11 (c.l.)	ton	——	- 40.00
Buca (c.l.)	ton	——	- 44.00
Catalpo (c.l.)	ton	——	- 33.00
Champion	ton	——	- 13.00
C.S.D. (c.l.)	ton	——	- 12.00
Crown	ton	——	- 13.00
Dixie (c.l.)	ton	——	- 13.00
Hi-White R	ton	——	- 15.00
Hydratex R	ton	28.00	- 45.00
Kaolloid Clay (c.l.)	ton	——	- 10.50
Markham (c.l.)	ton	——	- 13.00
McNamee (c.l.)	ton	——	- 12.50
Oldham (c.l.)	ton	——	- 13.00
Paragon	ton	12.50	- 30.50
Recco (c.l.)	ton	——	- 13.00
Stellar-R	ton	——	- 50.00
Suprex	ton	13.00	- 31.00
Upton	ton	19.50	- 21.00
Whitetex (c.l.)	ton	——	- 50.00
Witco No. 1 (c.l.)	ton	13.00	- 33.00
No. 2 (c.l.)	ton	13.00	- 33.00
Diatomaceous Earth	ton	30.00	- 50.00
Kaylorite (c.l.)	ton	——	- 30.00
Dolomite (c.l.)	ton	11.00	- 12.00
Flock			
Cotton	lb.	.08½	- .20
Filfloc F 40-9000	lb.	——	- .16
Filfloc F 6000	lb.	——	- .22
Rayon, bleached or dyed	lb.	.85	- 1.50
Rayon, grey	lb.	——	- .18
Solka-Floc (l.c.l.)	lb.	.05	- .15
Wool, bleached or dyed	lb.	.70	- 1.00
Glue, Bone (dlvd.)	lb.	.16½	- .18½
Graphite	lb.	.05	- .20
Ground Glass (l.c.l.)	lb.	.04	- .06
Leather, Shredded	lb.	.05	- .17
Lignin	lb.	.03	- .06
Indulin	lb.	——	- .09
Limestone, Pulverized	ton	3.25	- 10.00
Micro Velva	ton	45.00	- 47.00
Velvet Filler, Regular	ton	20.00	- 22.00
Magnesium Carbonate	lb.	.08	- .09
Clearcarb	lb.	.10¾	- .11¼
K & M	lb.	.08	- .09
Magnesium Oxide	lb.	.05	- .06
Magnesium Silicate	ton	18.00	- 35.00
Airex	ton	22.50	- 23.50
Asbestol	ton	20.00	- 22.00
Blue Star Talc	ton	——	- 23.00
L.S. Silver	ton	24.50	- 26.50
Sierra White	ton	21.25	- 23.25
Mica	lb.	.01¼	- .07¾
Concord	lb.	.0675	- .0750
Micro-Mica	lb.	.06¾	- .07½
Mineralite (c.l.)	ton	30.00	- 40.00
Silversheen	lb.	.06¾	- .07½
Triple A Mica (c.l.)	ton	——	- 25.00
Wet Ground Biotite Mica	lb.	.05½	- .06¼
Wet Ground Mica No. 160	lb.	.06¾	- .07½
Mineral Black			
Keystone 126	ton	——	- 13.00
Pyrophyllite			
Pyrax A (c.l.)	ton	——	- 12.50
WA (c.l.)	ton	——	- 14.00
Silica	ton	16.00	- 27.00
Blue Star	ton	——	- 21.50
Slate, Powdered (l.c.l.)	ton	15.00	- 20.00
Talc, Domestic	ton	9.00	- 20.00
Walnut Shell Flour	ton	38.00	- 80.00
Whiting, Commercial	ton	8.00	- 20.00
Cameline (c.l.)	ton	8.50	- 10.00
C-C-O White	ton	——	- 16.00
Keystone (c.l.)	ton	——	- 16.00
Rambo No. 1 White	ton	——	- 9.00
Snowflake (c.l.)	ton	——	- 18.00
Veroc (c.l.)	ton	——	- 8.50
Welco (c.l.)	ton	——	- 8.50
York White (c.l.)	ton	——	- 9.00
Wood Flour	ton	20.00	- 62.18

FINISHING MATERIALS, SURFACE

Besco Finishes	gal.	1.05	- 1.35
Black Out	gal.	4.50	- 8.00
Shellac, Orange Gum	lb.	.65	- .85
VanWax	gal.	1.25	- 1.30

FLAME RETARDANTS

Celluflex 179C (dms.)	lb.	——	- .39
Chlorinated Paraffin	lb.	.10	- .25
Halowax	lb.	.22	- .37
Zinc Borate 3167	lb.	.12	- .16¾
Zyrox	lb.	.65	- .79

LUBRICANTS, MOLD

Aquadag	lb.	3.15	- 3.45
Aquarex BBX Conc. (dlvd.)	lb.	——	- .78
D (dlvd.)	lb.	——	- .76
L Paste (dlvd.)	lb.	——	- .85
MDL Paste (dlvd.)	lb.	——	- .30
Borax, Granular (l.c.l.)	ton	70.00	- 80.00
Colite Concentrate (dms.)	gal.	——	- .90
Concentrex	lb.	——	- .20
D.C. Emulsion No. 35	lb.	2.20	- 3.50
Dipex	lb.	.14	- .18
Dri-Lube	lb.	——	- .18
Erlen Mold Lubricant	gal.	1.25	- 1.50
Glycerized Lubricant	gal.	——	- 1.85
Glydag	lb.	1.30	- 2.00
Kokobace	lb.	——	- .12
Latex-Lube (dlvd.)	lb.	——	- .22¾
Liqui-Lube (dlvd.)	lb.	——	- .16¾
Lubrex	lb.	.25	- .30
Migralube	lb.	——	- .30
Moldeze No. 1	gal.	——	- 36.00
No. 3	gal.	——	- 7.50
Mold Lubricant No. 72 Conc.	gal.	1.26	- 2.75
Mold-Slick	lb.	.202	- .215
Orvus WA Paste (dms.)	lb.	——	- .25
Prodag	lb.	.25	- .38
Redotex Flakes (dlvd.)	lb.	.19¾	- .20
Powder (dlvd.)	lb.	.19⅞	- .20½
Rubber-Flo	gal.	——	- 1.15
Rubber-Glo	gal.	——	- .94
Rusco Mold Paste	lb.	——	- .18
Sericite (l.c.l.)	ton	65.00	- 75.00
Thermalube	lb.	——	- .11
Ulco Mold Soap	lb.	.16	- .29
Werkrite Flakes (dlvd.)	lb.	.17⅜	- .18
Powder (dlvd.)	lb.	.18⅜	- .19

LUBRICANTS, RUBBER

Propylene Stearate (drums)	lb.	——	- .40
Rubberol	lb.	——	- .3150

LUBRICANTS, RUBBER SURFACE

Barium Stearate	lb.	.48	- .49
Calcium Stearate	lb.	.45	- .47
Polyethylene Glycol	lb.	.25	- .26
Rexanol A	lb.	——	- .11
Separex A	lb.	——	- .15
Zinc Stearate	lb.	.48	- .49

MOLD CLEANERS

Actusol (dlvd.)	gal.	——	- 1.45
Metso 99	cwt.	3.05	- 4.45
Granular	cwt.	2.50	- 3.55
Rubber-Sol	gal.	——	- 2.75
Shelblast	ton	80.00	-140.00
Sodium Silicate	cwt.	.80	- 1.40
Sprex A.C. (dlvd.)	lb.	——	- .15½

PEPTIZING AGENTS

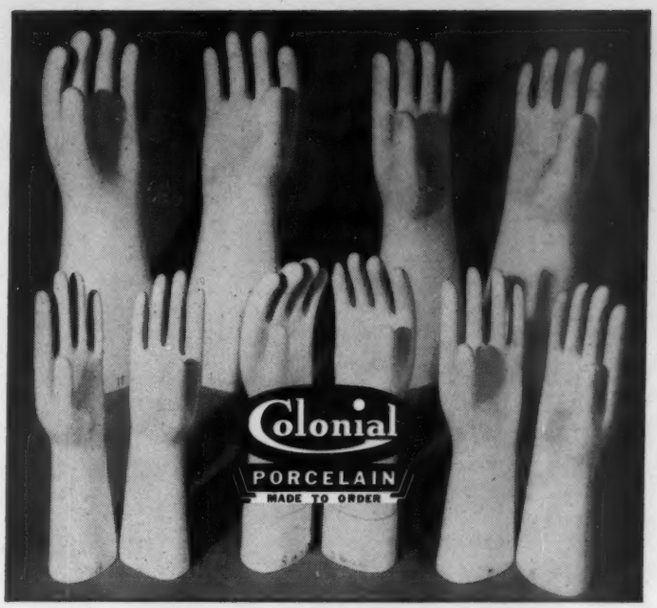
Peptizer P-12	lb.	.84	- .90

PLASTICIZERS & SOFTENERS

AA (drums)	lb.	——	- .23
Acto 500	lb.	——	- .09
Adipol BCA (dms.)	lb.	.44½	- .45
Amalgamator Z-4	lb.	——	- .30
American Pine Tar	gal.	.34½	- .45½
Arolene 1980 (c.l.)	lb.	——	- .10
2286	lb.	——	- .25
2553 (c.l., dms.)	lb.	——	- .13
Bardol	lb.	.02¾	- .03¾
B	lb.	.05½	- .05¾
Bayol D	gal.	.29½	- .31½
F	gal.	.46	- .49
Beeswax, Refined & Bleached	lb.	.64	- .74
Yellow Refined	lb.	.63½	- .68
Bondogen	lb.	.55	- .60
B.R.C. No. 20	lb.	.0125	- .0135
B.R.H. 2	lb.	.02	- .029
BRS 700	lb.	.0175	- .026
B.R.T. 3	lb.	.024	- .025
4	lb.	.0225	- .0235
7	lb.	.0265	- .0275
B.R.V.	lb.	.0325	- .04
Bunarex Resins	lb.	.06	- .0750
Bunatak M	lb.	——	- .20
O	lb.	——	- .18
R	lb.	——	- .14
U	lb.	——	- .15
No. 21	lb.	——	- .08
No. 90	lb.	——	- .08
No. 865	lb.	——	- .17
No. 1080	lb.	——	- .09½

PLASTICIZERS & SOFTENERS (Cont'd)

Burgundy Pitch	lb.	.1026	- .1050
Butac	lb.	.11	- .12
Butyl Benzyl Sebacate	lb.	——	- .67
Butyl Carbitol Perlargonate (dms.)	lb.	——	- .645
Butyl Cellosolve Perlargonate (dms.)	lb.	——	- .68
Butyl Palmitate	lb.	——	- .26⅜
Butyl Roleate	lb.	.176	- .18
Butyl Stearate	lb.	——	- .465
BWH-1	lb.	——	- .14
Califlux 510, 550	lb.	.025	- .0325
G.P.	lb.	.0125	- .02
R-100	lb.	.05	- .0575
Campol (t.c.)	ton	——	- 42.00
Candelilla Wax Prime	lb.	.67	- .75
Capryl Benzyl Sebacate	lb.	——	- .68
Carbonex	lb.	.0325	- .0375
S Flakes	lb.	.0475	- .0525
S Plastic	lb.	.046	- .051
644	lb.	.0375	- .04
Carbowax 4000 (drums)	lb.	.31	- .32
Cardolite 615	lb.	.37	- .40
816	lb.	.25½	- .28½
5858	lb.	.42	- .46
Carnauba Wax, Crude	lb.	.70	- .75
Refined	lb.	.85	- .90
Substitute	lb.	.45	- 1.08
Yellow	lb.	1.20	- 1.25
Ceresine Wax	lb.	.15	- .20
Contogum	lb.	.06¾	- .10½
Cumar Resins	lb.	.05½	- .14½
D.B.M.	lb.	——	- .30
Degras, Common	lb.	.10	- .14
Diamylphenol (l.c.l., dms.)	lb.	——	- .28
Dibenzyl Sebacate	lb.	——	- .76
Dibutoxethyl Sebacate	lb.	——	- .625
Dibutyl Phthalate	lb.	.36	- .385
Dibutyl Sebacate—Tech.	lb.	——	- .67
C.P.	lb.	——	- .69
Dicapryl Adipate	lb.	——	- .40
Dicapryl Phthalate	lb.	——	- .45
Dicaprył Sebacate	lb.	——	- .645
Di-Carbitol Phthalate (dms.)	lb.	.39½	- .40
Dicyclohexyl Phthalate	lb.	——	- .43
Dielex	lb.	.0625	- .0650
Diethyl Phthalate (t.c.)	lb.	.31½	- .38½
Dihexyl Adipate	lb.	——	- .36
Dihexyl Phthalate	lb.	——	- .35
Dihexyl Sebacate	lb.	——	- .49
Di Isobutyl Azelate (dms.)	lb.	——	- .715
Dimethyl Phthalate	lb.	——	- .28
Dimethyl Sebacate	lb.	——	- .715
Dinopol (dms.)	lb.	.50½	- .51
Dioctyl Phthalate (dms.)	lb.	.43½	- .44
Dipolymer Oil	gal.	.33	- .38
Dispersing Oil No. 10	lb.	.0525	- .055
Dutrex A (B, 5, 6)	lb.	.02½	- .03¾
15	gal.	.10	- .189
20, 21, 25	lb.	——	- .03
ELA (dlvd.)	lb.	——	- .80
Estac	lb.	——	- .16
Ethox (dms.)	lb.	.4250	- .43
Flexol DOP	lb.	——	- .433
TOF	lb.	——	- .475
3GH	lb.	——	- .475
3GO	lb.	——	- .53
4GO	lb.	——	- .435
G. B. Light Process Oil	lb.	.025	- .0325
H-70	lb.	.56¾	- .64½
Hercoyln (dlvd.)	lb.	.1675	- .1725
Herron-H.T.	gal.	.2400	- .2700
Herron-Plas	lb.	.0350	- .0375
Herron-Wax	lb.	.0500	- .0550
HT-300	lb.	.45¾	- .53
Indonex 632½ (633½, 634½, 638½)	gal.	.1200	- .1700
VG (dlvd.)	lb.	——	- .07
Indopol H-300 (bbls.)	gal.	1.28	- 1.32
JMH	lb.	——	- .65
KP 23 (dms.)	lb.	.49½	- .50
KP 23 (dms.)	lb.	.49½	- .50
70 (dms.)	lb.	.41½	- .42
120 (dms.)	lb.	.44½	- .45
140 (dms.)	lb.	.49½	- .50
150 (dms.)	lb.	.44½	- .45
Kronisol (drums)	lb.	.40	- .40½
Kronitex (drums)	lb.	.37½	- .38
Lanolin, Tech. Anhydrous	lb.	——	- .19
Lead Oleate	lb.	.16½	- .42
Lindol (drums)	lb.	——	- .38
2-Mercaptoethanol (drums)	lb.	——	- .75
Methox (dms.)	lb.	.41	- .41½
Methyl Oleate	lb.	——	- .20
Methyl Stearate	lb.	——	- .70
Monoplex DBS	lb.	.90	- .91
Monoplex DOS	lb.	.84	- .85
5 (dms.)	lb.	.98	- 1.00
11 (dms.)	lb.	.50	- .51
16 (dms.)	lb.	.45	- .46
Montan Substitute No. 506	lb.	.425	- .435
Montan Wax, Crude	lb.	.50	- .55
Monten Wax (c.l.)	lb.	.52	- .55
Monty Wax	lb.	——	- .35
Natac	lb.	.1050	- .1150
Neolene 210 (t.c.)	lb.	——	- .16
212 (t.c.)	lb.	——	- .14
220 (t.c.)	lb.	——	- .15
Nerium	lb.	——	- .09
Nevillac Resins (dms.)	lb.	.23	- .45
Neville Resins (dms.)	lb.	.10	- .15½
Nevindene Resins (dms.)	lb.	.12½	- .15½
Nevinol (dms.)	lb.	——	- .17



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PLASTICIZERS & SOFTENERS (Cont'd)

Nevoll	lb.	.0325	.0425
Nevtex 10 (dms.)	lb.	—	.10½
Nuba 1 (and 2) (dms.)	lb.	—	.04
3X (dms.)	lb.	—	.065
15 (and 30) Oil (dms.)	lb.	—	.25
781 Oil (dms.)	lb.	—	.28½
No. 480 Oil Proof Resin	lb.	—	.15
Ohopex Q10 (dms.)	lb.	.435	.44
Opalwax	lb.	.37	.38
Ortho-Nitrobiphenyl	lb.	.06	.11
Ozokerite Wax No. 64 White	lb.	.31	.32
Yellow	lb.	.25	.26
P-1 (and 4, 6, 8, 20)	lb.	.30	.35
P-75	lb.	.66	.72
Pale 4 (and 1000)	lb.	—	.25
Palm Oil	lb.	—	.11
Paradene Resins (dms.)	lb.	.065	.075
Para Flux (dms.)	gal.	.1875	.1975
2016 (l.c.l.)	gal.	.22	.23
Para Lube (l.c.l.)	lb.	.046	.048
Paraplex G-25	lb.	.90	.91
G-40	lb.	.48¾	.49¾
Parmo	lb.	.06	.13½
Pentalene 90 (l.c.l., dms.)	lb.	—	.245
92 (l.c.l., drums)	lb.	—	.26
Pentaphen No. 114 (l.c.l., bags)	lb.	—	.27
Pepton 22	lb.	.72	.75
PG-16 (drums)	lb.	—	.34
Philplast No. 1	gal.	.18	.35
No. 2	gal.	.13	.35
Picco 10 (and 25)	lb.	—	.12
75 (and 100)	lb.	—	.11½
S.O.S.	gal.	.29	.34
Piccocizer 30	lb.	.05½	.06
Piccolastic A (and B, C, D, E)	lb.	.22	.22½
F	lb.	.139	.144
Piccolyte S Resins	lb.	.1500	.1575
Piccoumaron Resins	lb.	.06½	.14½
Piccovar	lb.	.12	.12½
Piccovol	lb.	.02½	.04
Pictar	gal.	.25	.30
Plas-Blend 360	lb.	.03	.04
Plastac M	lb.	—	.09¼
Plasticizer No. 50B	lb.	.365	.385
Plasticizer FP-6	lb.	—	.65
Plasticizer SC	lb.	.50	.52
Plasticizer VA-1	lb.	—	.40
Plasticizer XP-3	lb.	—	.50
Plastoflex 50	lb.	—	.38
J-21	lb.	—	.41
Plastogen	lb.	.07¾	.08
Plastolein X-55 (dms.)	lb.	—	.60
X-148 (dms.)	lb.	—	.70
Plastone	lb.	.27	.30
Polymel D	lb.	—	.20
Polymel Liquid	gal.	.12	.17
Polymel Resins	lb.	.029	.05
Process Oil C-255	gal.	—	.22
PT 400 Pine tar oil (600, 800) (t.c., dms.)	gal.	.34½	.45½
Refrigerator Oil 145-R	gal.	—	1.25
Reogen	lb.	.11¾	.12
465 Resin (drums)	lb.	—	.0575
Resin 731	lb.	—	.13¾
Resin C	lb.	.02	.0275
Resinex	lb.	.03¼	.04
L-4	lb.	.02¼	.03
Ridbo 369 (drums)	lb.	.08	.09
369-F (drums)	lb.	—	.12
Rosin Oil	gal.	.54	1.20
R.P.A. No. 2 (dlvd.)	lb.	—	.65
No. 3 (dlvd.)	lb.	—	.46
No. 5 (dlvd.)	lb.	—	.57
R.S.O. Softening Oil	lb.	.03	.05
Rubtar	gal.	—	.40
Santicizer B-16	lb.	.50	.57
E-15	lb.	.47	.54
M-17	lb.	.44	.51
No. 140	lb.	.31	.38
Softener No. 20	gal.	.09	.25
S.P.C.	lb.	—	.19½
Stanolind Petrolatum	lb.	.037	.081
Wax	lb.	.25	.30
Staybelite Resin (dms.)	lb.	—	.11
Sunny South Burgundy Pitch	cwt.	10.51	10.75
Sunny South Pine Tar	gal.	.34½	.45½
Sunny South Rosin Oil	gal.	.50	.67¾
Superla Wax	lb.	.25	.30
Syncera Wax	lb.	.175	.225
Synplasticizer	lb.	—	.10
Syn Tac (c.l.)	gal.	—	.33
Synthol	lb.	—	.2550
Tar, Refined	gal.	.12	.17
K-Tarnel NR (t.c.)	lb.	—	.0851
Terpene A	gal.	—	.65
TP-90B (and TP-95)	lb.	.55	.65
TP98	lb.	—	.50
Triacetin	lb.	.34	.45
Tricresyl Phosphate	lb.	.31	.33½
Turgum S	lb.	.09½	.10½
Vandiset A	gal.	.13	.20
Vanadiset B, C, D	lb.	.021	.055
Pulverized	lb.	.08½	.31
Solution	gal.	.40	.65
Vistac No. 1	gal.	—	1.32
No. 2	gal.	—	1.66
No. 4	gal.	—	1.80
Witresin—Granular	ton	41.00	43.00
Solid	ton	36.00	38.00

PROCESSING AIDS

Castor Oil, Processed (dms.)	lb.	—	.17¼
Refined (drums)	lb.	—	.15¾
Castorwax (min. 400 lbs.)	lb.	—	.34
Dutrex 7	lb.	.02½	.03¾
30	gal.	.24	.27
ELA (dlvd.)	lb.	—	.80
Heron S.P.O.	lb.	.22	.23
Resin No. 510	lb.	—	.19

PROTECTIVE & STABILIZING AGENTS

Acacia	lb.	.12¾	.21
Agchem SA-9 (to SA-12)	lb.	.65	1.02
Alpha Protein	lb.	.28	.32
Aroostoocrat	lb.	—	.07½
Carob Bean Flour	lb.	.42	.50
Casein	lb.	.29	.37
Ethylene Diamine 68%	lb.	.57	.58
Karaya Gum	lb.	.20	.50
Prosein	lb.	.071	.09
Rex Compound No. 2801	lb.	—	.15
Sodium Alginate	lb.	—	1.50
Stablex B	lb.	—	.95
Tragacanth Flakes	lb.	.60	1.35

RECLAIMING AGENTS

1-D Heavy Oil (drums)	lb.	.0450	.0550
No. 517 H.B. Oil	gal.	.11½	.16½
535	gal.	.22	.27
C-6 Oil (and 28, 32)	gal.	.33	.38
C-10 Oil	gal.	.25	.30
C-33 Oil	gal.	.20	.25
Caustic Soda—Flake 76% (c.l., drums)	cwt.	—	3.25
Liquid 50% (t.c.)	cwt.	—	2.25
Solid 76% (c.l., dms.)	cwt.	2.50	2.85
Cresylic Acid (99-100%)	gal.	1.55	1.69
D-4	gal.	.23	.28
E-5	gal.	.21	.26
G. B. Reclaiming Oil	gal.	.12	.18
Heavy Aromatic Naphtha (t.c.)	gal.	—	8.25
LX-77 Reclaiming Solvent	gal.	.15	.21
LX-572 Reclaiming Oil	gal.	.23	.28
PT 67 Pine tar oil	gal.	.60	.70
PT 101 Pine tar oil	gal.	.34½	.45½
PT 150 Solventene	gal.	.44	.45
Q Oil	gal.	.246	.296
Reclaiming Oil 1621	lb.	.03	.04
Reclaiming Oil 3186	gal.	—	.26
Reclaiming Oil 3186-G	gal.	—	.26
Reclaiming Reagent No. 4	lb.	.12	.15
Reclaiming Resin No. 1	gal.	.15	.35
R.P.A. No. 3 (dlvd.)	lb.	—	.46
Soda Ash (c.l., bags)	cwt.	—	1.20
Solvent 534	gal.	.22	.27
Solvent Oil 21	gal.	.24	.29
C-42	gal.	.27	.32
X-1 Resinous Oil	lb.	.0175	.0250
X-60 Solvent	gal.	.24	.32

REINFORCING AGENTS—CARBON BLACK

Channel, Hard Processing (HPC) (bags)

Atlantic HPC-98	lb.	.0732	.1175
Continental F	lb.	.0732	.1125
Croflex	lb.	.0732	.1125
Crow	lb.	.0732	.1125
Dixiedensed (and S)	lb.	.0732	.1125
Kosmobile (andS)	lb.	.0732	.1125
Kosmos T	lb.	.0732	.1125
Micronex HPC	lb.	.0732	.1125
Spheron 4	lb.	.0732	.1170
Witco Disperso No. 6	lb.	.0732	.1125

Channel, Medium Processing (MPC) (bags)

Atlantic MPC-95	lb.	.0732	.1175
Continental A	lb.	.0732	.1125
Croflex TH	lb.	.0732	.1125
Dixie R-1	lb.	.0732	.1125
Dixiedensed HM (and S-66)	lb.	.0732	.1125
Huber Arrow TX	lb.	.0732	.1150
Kosmobile HM (and S-66, SMG)	lb.	.0732	.1125
Kosmos M	lb.	.0732	.1125
Micronex Standard	lb.	.0732	.1125
Spheron 6	lb.	.0732	.1170
Texas M	lb.	.0732	.1125
Witco Disperso No. 1	lb.	.0732	.1125

Channel, Easy Processing (EPC) (bags)

Atlantic EPC E-42	lb.	.0732	.1175
Continental AA	lb.	.0732	.1125
Croflex 77	lb.	.0732	.1125
Dixiedensed 77	lb.	.0732	.1125
Kosmobile 77	lb.	.0732	.1125
Micronex W-6	lb.	.0732	.1125
Spheron 9	lb.	.0732	.1170
Texas E	lb.	.0732	.1125
Witco Disperso No. 12	lb.	.0732	.1125
Wyex	lb.	.0732	.1150

Channel, Conductive (CC) (bags)

Dixie 5 dustless	lb.	.0732	.1125
Kosmink dustless	lb.	.0732	.1125
Spheron C	lb.	.1200	.1600
Spheron I	lb.	.1000	.1400
Spheron N	lb.	.2200	.2500
Voltex	lb.	.1500	.1850

Furnace, Fast Extruding (FEF) (bags)

Statex M	lb.	.0550	.0950

Furnace, High Modulus (HMF) (bags)

Continex HMF	lb.	.0500	.0900
Dixie 40	lb.	.0500	.0900
50	lb.	.0550	.0950
Kosmos 40	lb.	.0500	.0900
50	lb.	.0550	.0950
Modulex	lb.	.0500	.0900
Philblack A	lb.	.0550	.0950
Statex 93	lb.	.0500	.0900
Sterling L	lb.	.0500	.0900
Sterling SO	lb.	.0550	.0950

Furnace, Reinforcing (RF) (bags)

Kosmos 60	lb.	.0732	.1150

Furnace, Semi-Reinforcing (SRF) (bags)

Continex SRF	lb.	.0350	.0750
Dixie 20	lb.	.0350	.0750
Essex	lb.	.0350	.0750
Furnex	lb.	.0350	.0750
Gastex	lb.	.0350	.0750
Kosmos 20	lb.	.0350	.0750
Pelletex	lb.	.0350	.0750
Seminex	lb.	.0350	.0750
Sterling NS	lb.	.0350	.0750
Sterling R	lb.	.0350	.0750
Sterling S	lb.	.0350	.0750

Furnace, Fine (FF) (bags)

Statex B	lb.	.0575	.0975
Sterling 99	lb.	.0650	.1050

Furnace, High Abrasion (HAF) (bags)

Philblack O	lb.	.0732	.1132
Vulcan	lb.	.0732	.1170

Furnace, Very Fine (VFF) (bags)

Statex K	lb.	.0732	.1125
Sterling 105	lb.	.0732	.1170

Thermal, Fine (FT) bags)

P-33	lb.	—	.0500

Thermal, Medium (MT) (bags)

Thermax (c.l.)	lb.	—	.0300

REINFORCING AGENTS—MISCELLANEOUS

Darex Copoylmer No. 3 (and X34)	lb.	.35	.37
No. X43	lb.	.36	.38
Darex Copolymer Latex No. 3 (and X34)	lb.	.36½	.50
Durez 12687 (and 12707)	lb.	—	.32
Durez 13355	lb.	—	.26
Marbon B	lb.	.65	.75
S and S-1	lb.	.36	.43
Marmix	lb.	.36	.43
Pliolite S6 Resin	lb.	.36	.37
G Masterbatch	lb.	.35	.36
G50 Masterbatch	lb.	.35	.36
R Masterbatch	lb.	.38	.39

RETARDERS

ESEN	lb.	.34	.39
Retardex	lb.	—	.51

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Mineral Rubber

38	ton	26.00	32.50
Black Diamond	ton	26.00	27.50
Byerlyte	ton	42.50	57.50
Gilsonite, Selects (c.l.)	ton	33.50	34.50
Hard Hydrocarbon (dms.)	ton	42.00	44.00
Herron Flake	ton	47.50	48.50
Mineral Rubber, solid	ton	41.60	43.00
Parmr (drums)	ton	26.00	30.00
Pioneer	ton	33.00	60.00

Vulcanized Vegetable Oils (Factice)

Amberex	lb.	.337	.416
Brown	lb.	.153	.3335
Dispersed	lb.	.275	.490
Neophax	lb.	.190	.356
White	lb.	.144	.351

Miscellaneous Rubber Substitutes

Gilsowax	lb.	.04½	.05
Insulac	lb.	.06	.06½
Resin No. 1098 (drums)	lb.	—	.65
No. 1198	lb.	.31	.35

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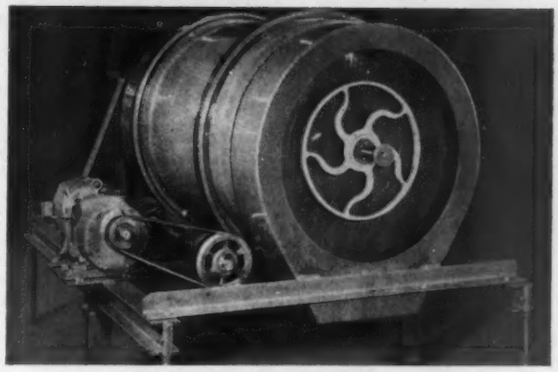

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SOLVENTS

Acetone (dlvd.)	lb.	.08½	.10½
American Dipentene	gal.	.38	.39
Amsco Lactol Spirits (t.c.)	gal.	——	.16
Rubber Solvent (t.c.)	gal.	——	.15
Solv A (t.c.)	gal.	——	.22
Solv B (t.c.)	gal.	——	.26
Special Napthalite (t.c.)	gal.	——	.15
Textile Spirits (t.c.)	gal.	——	.16
Amyl Chlorides, Mixed (l.c.l.) (drums)	lb.	——	.08
Benzol 90%	gal.	.17	.24
Butyl Acetate (t.c.)	lb.	——	.175
Butyl Alcohol (t.c.)	lb.	——	.175
Secondary (dlvd.)	lb.	.10½	.12½
Tertiary (dlvd.)	lb.	.12	.14
Carbon Bisulfide, Tech.	lb.	.05	.08
Carbon Tetrachloride	gal.	——	.80
Cosol 1	gal.	.30	.38
Cosol 2	gal.	.30	.38
Cyclohexane	lb.	.095	.11
Cyclohexanone	lb.	.25	.27 a
Diacetone, Pure (dlvd.)	lb.	.12	.14
Dichlorethyl Ether (dms.)	lb.	.165	.17
Formal (dms.)	lb.	.265	.27
Dichloropentane (l.c.l.)	lb.	——	.04½
Dipentene 122 (dms.)	gal.	——	.39
Ethyl Alcohol (t.c.)	gal.	——	.96
Ethylene Dichloride (drums, dlvd.)	lb.	.08	.09½
Halowax Oil	lb.	.22	.37
Heptanes (t.c.)	gal.	——	.15
Hexalin Cyclohexanol	lb.	.20	.22 a
Hexanes (t.c.)	gal.	——	.15⅜
Isopropyl Alcohol, Ref. 99% (dlvd.)	gal.	.45	.57½
Ether, Ref. (dlvd.)	lb.	.04½	.06½
Mesityl Oxide (dlvd.)	lb.	.1350	.1850
Methanol (dms., dlvd.)	gal.	.28	.475
Methyl Acetone, Syn. (drums, dlvd.)	gal.	.615	.65
Methyl n-Amyl Ketone (drums)	lb.	.37	.39
Methyl Ethyl Ketone	lb.	.10	.12½
Methyl Isobutyl Ketone (dlvd.)	lb.	.14	.145
N-5 Pentane Mix. (t.c.)	gal.	——	.11½
N-6 Hexanes (t.c.)	gal.	——	.14
N-7 Hexanes (t.c.)	gal.	——	.13
Petrolene (t.c.)	gal.	——	.10⅛
Picolines, Aplha, Refined	lb.	.75	1.00
Mixed	lb.	——	.45
Pyridine, Refined	lb.	.80	.89
Quinoline	lb.	.50	.60
Rubber Solvent (t.c.)	gal.	——	.12½
Rubsol (t.c.)	gal.	——	.08625
Skellysolve B (Hexanes) (t.c.)	gal.	——	.141
C (Heptanes) (t.c.)	gal.	——	.133
E (Octanes) (t.c.)	gal.	——	.155
R (Solvent Naphtha)	gal.	——	.109
Solvenol	gal.	——	.39
Solvent, Crude, Light	gal.	.19	.28
Solvesso 100 (t.c.)	gal.	——	.2812
150 (t.c.)	gal.	——	.2812
Sunny South Dipentene	gal.	.38	.39
Toluene (drums)	gal.	——	.28
Toluol (t.c.)	gal.	——	.23
Trichlorethane	lb.	.11	.12
Triglycol Dichloride (dms.)	lb.	.519	.59
Tromex	lb.	.078	.083
X-7 Sp. Heptanes (t.c.)	gal.	——	.11
Xylene (drums)	gal.	——	.28

STABILIZING AGENTS (for Vinyl Resins)

Dutch Boy DS-207	lb.	——	.54
Plumb-O-Sil A	lb.	——	.28¾
Tribase	lb.	——	.26¼
Eagle Basic Silicate White Lead	lb.	.21	.23¾
Lead Stearate, Precip.	lb.	.55	.57
Fused	lb.	.60	.62
Lithium Stearate	lb.	.75	.77
Stabelan A	lb.	.55	.65
Stabilizer V-7939	lb.	——	.60
Stabilizer JCX	lb.	.49	.51
SN	lb.	——	.42
V-1-N	lb.	.44	.50
V-9	lb.	——	.85
Vanstay	lb.	.33	.35

SUN CHECKING AGENTS

Antisol	lb.	.25	.26
Heliozone (dlvd.)	lb.	.25	.26
Sunproof	lb.	.25	.30
Jr.	lb.	.18	.23
Tonox	lb.	.50	.59

TACKIFIERS

Advaresin 100	lb.	.13½	.14
Agchem RC 30	gal.	.65	1.34
Amberol ST-137X	lb.	.33	.33½
Beckopol 1400 (dlvd.)	lb.	.2650	.27
Dutrex 44	gal.	——	.919
E-310 Resin Emulsion	lb.	——	.14
Galex (drums)	lb.	.1325	.1725
Koresin	lb.	.46	.58
Lindol Emulsion (drums)	lb.	——	.38
Liquid Rubber Flux	lb.	——	.125
Pentalyn Resins (dlvd.)	lb.	.19½	.22½
Resin V	lb.	——	.23¼
Rubtack	lb.	——	.12
Staybelite Esters (dlvd.)	lb.	.2100	.2150
Super-Beckacite No. 1001 (dlvd.)	lb.	.34	.34½
Vistac No. 1	gal.	——	1.32
No. 2	gal.	——	1.66
No. 4	gal.	——	1.80

THICKENERS (FOR LATEX)

Acrysol GS	lb.	.14½	.22
Betanol (drums)	lb.	——	.70
Emulsorex No. 5	lb.	——	.35
Propylene Laurate (dms.)	lb.	——	.36
Sodium Silicate	lb.	.01	.02

VULCANIZING AGENTS

Selenium

Vandex	lb.	——	2.00

Sulfur

Blackbird	cwt.	——	2.05
Crystex (l.c.l.)	lb.	.19½	.23
Dispersed Sulfur	lb.	——	.09
No. 2	lb.	.10	.15
Devil (c.l.)	cwt.	——	1.35
Insoluble Sulfur 60	lb.	.13	.13½
Spider	cwt.	——	2.05
Star (c.l.)	cwt.	——	1.85
Tire	cwt.	1.50	2.00
Tube (c.l., dlvd.)	cwt.	2.00	2.60

Tellurium

Latex Telloy	lb.	——	2.00
Telloy	lb.	——	2.00

Miscellaneous Vulcanizing Agents

VA-3	lb.	.55	.65
Vultac No. 1	lb.	.38	.45
No. 2	lb.	.38	.45
No. 3	lb.	.42	.49

WASHING & FINISHING AGENTS

Apcolene (t.c.)	gal.	——	.09⅛

WETTING AGENTS

Advawet No. 10	lb.	——	.35
No. 15	lb.	——	.18
No. 33	lb.	.40	.43
Aerosol OT 70% Clear	lb.	.80	1.00
Agchem SA-15 (16, 18)	lb.	.17	.29
Alrosol (dms.)	gal.	——	.48
Aquarex ME (dlvd.)	lb.	——	.92
NNS (dlvd.)	lb.	——	.60
NS (dlvd.)	lb.	——	.75
Areskap 50	lb.	.30	.38
Dry 100	lb.	.60	.72
Aresket 240	lb.	.30	.38
Dry 300	lb.	.60	.72
Aresklene 375	lb.	.42	.57
Dry 400	lb.	.70	.84
Lecithin	lb.	——	.22
Santomerse D	lb.	.43	.65
S	lb.	.12	.25
Sorbit P	lb.	——	.28
Stablex G	lb.	——	.70
Triton K-60	lb.	.33½	.41
N-100	lb.	.59½	.67
R-100	lb.	.14½	.25
720	lb.	.30½	.38
770	lb.	.21¾	.29¼
Vultamol	lb.	——	.17½

MISCELLANEOUS CHEMICALS

Acto 450 (550-W, 600, 630)	lb.	.109	.145
Agchem SA-17	lb.	——	.29
Aquarex SMO (dlvd.)	lb.	——	.50
A.S.T.M. Oil No. 1 (and No. 3)	gal.	1.00	1.15
Copper Inhibitor X-872-L.	lb.	——	1.75
2-Ethylhexanol (dms., dlvd.)	lb.	.25	.26
Glycerine, 88% Sap., Crude (dlvd.)	lb.	.35½	.36
MODX (tons)	lb.	——	.29½
Para Resin No. 1784	lb.	——	.09¾
No. 2457 (c.l.)	lb.	——	.04
No. 2718 (c.l.)	lb.	——	.04
pHR	lb.	——	2.00
Pigmented Filmite	lb.	——	.16½
Polyvinyl Methyl Ether	lb.	——	1.00
Reference Fluid SR-6	gal.	.85	1.00
SR-10	gal.	.60	.75
Resin No. 1226	lb.	.31½	.36½
Resorcinol (dlvd.)	lb.	——	.64
Rio Resin	lb.	.50	.52
Santocel	lb.	——	.50
Sublac	lb.	.31	.34
Synpep N (drums)	lb.	——	.54
Thiokol LP-2	lb.	——	.90
LP-3	lb.	——	.90
Tysonite	lb.	.21½	.22¼
Vanfre	gal.	2.00	2.50
Vinsol Resin—Lumps	lb.	——	.06

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YOUNG CHEMICAL ENGINEER with management experience in development and production of synthetic rubbers, plastic films and flooring, molded and extruded goods, coated fabrics, rubber chemicals, etc., desires responsible position with good future outlook in development, production, or sales engineering of plastics, rubber, chemicals, or equipment. Availability two weeks. Address Box 217P, RUBBER AGE.

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SUPERINTENDENT-CHEMIST, now employed, desires new connection. Twenty years' practical experience, large and small plants manufacturing mechanical and sponge rubber items. Educated chemical-mechanical engineer. Location immaterial. Address Box 227P, RUBBER AGE.

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RUBBER TECHNOLOGIST, 1947 or 1948 graduate. Laboratory development and quality control. Give full details of education, experience, references, salary expected, and recent, full-length photograph in first letter. Address Box 209W, RUBBER AGE.

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Company supplying rubber compounding materials and machinery wants young man for export sales promotion including foreign travel. Compounding and/or technical sales background essential; foreign languages desirable. Address Box 218W, RUBBER AGE.

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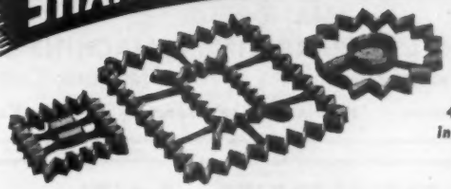

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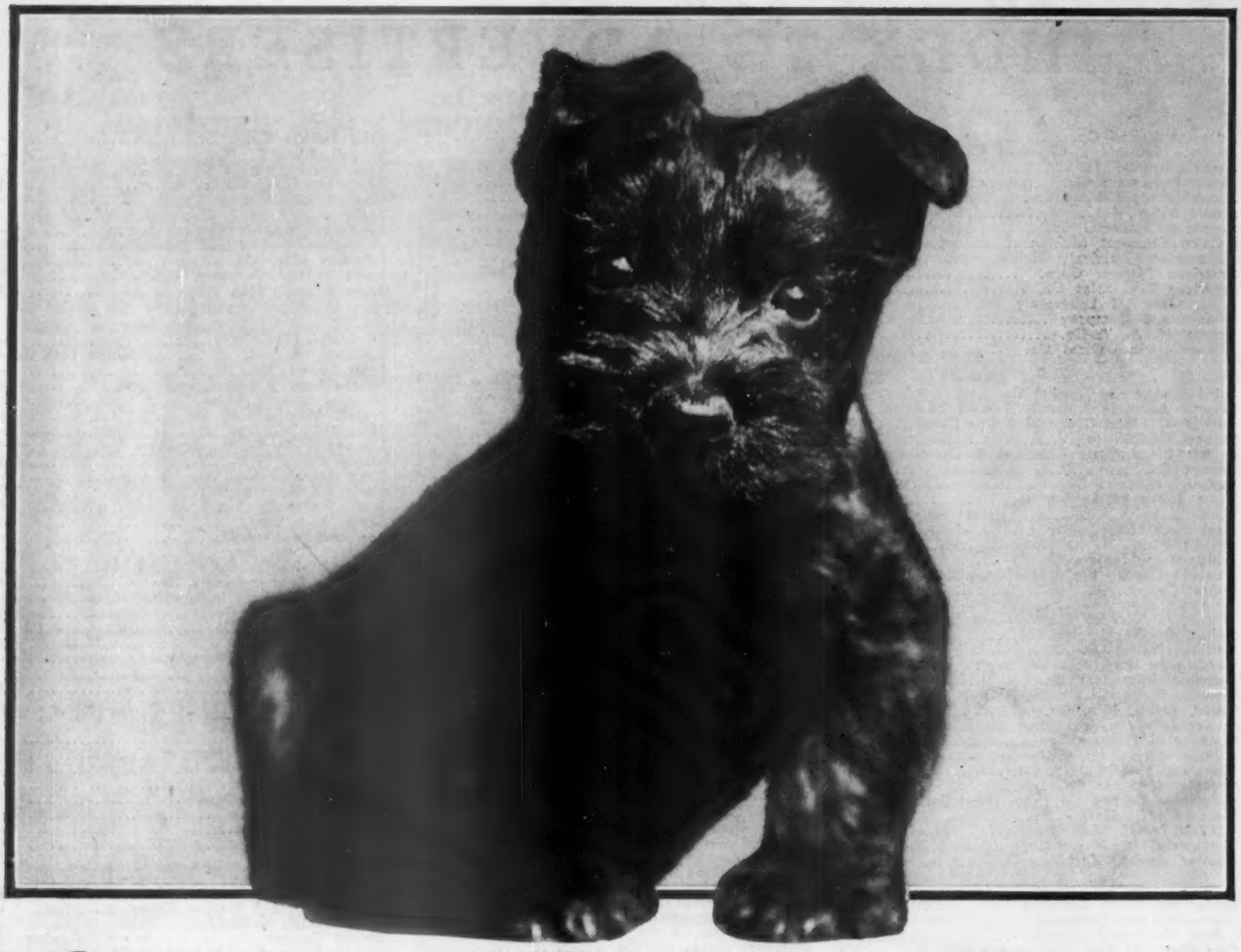

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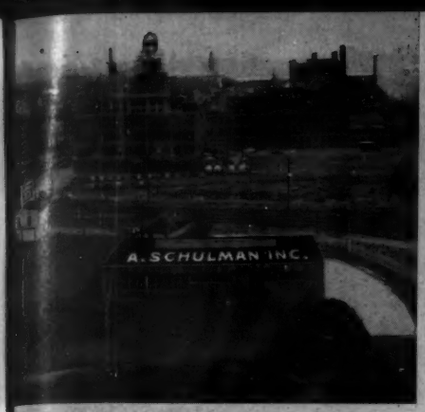

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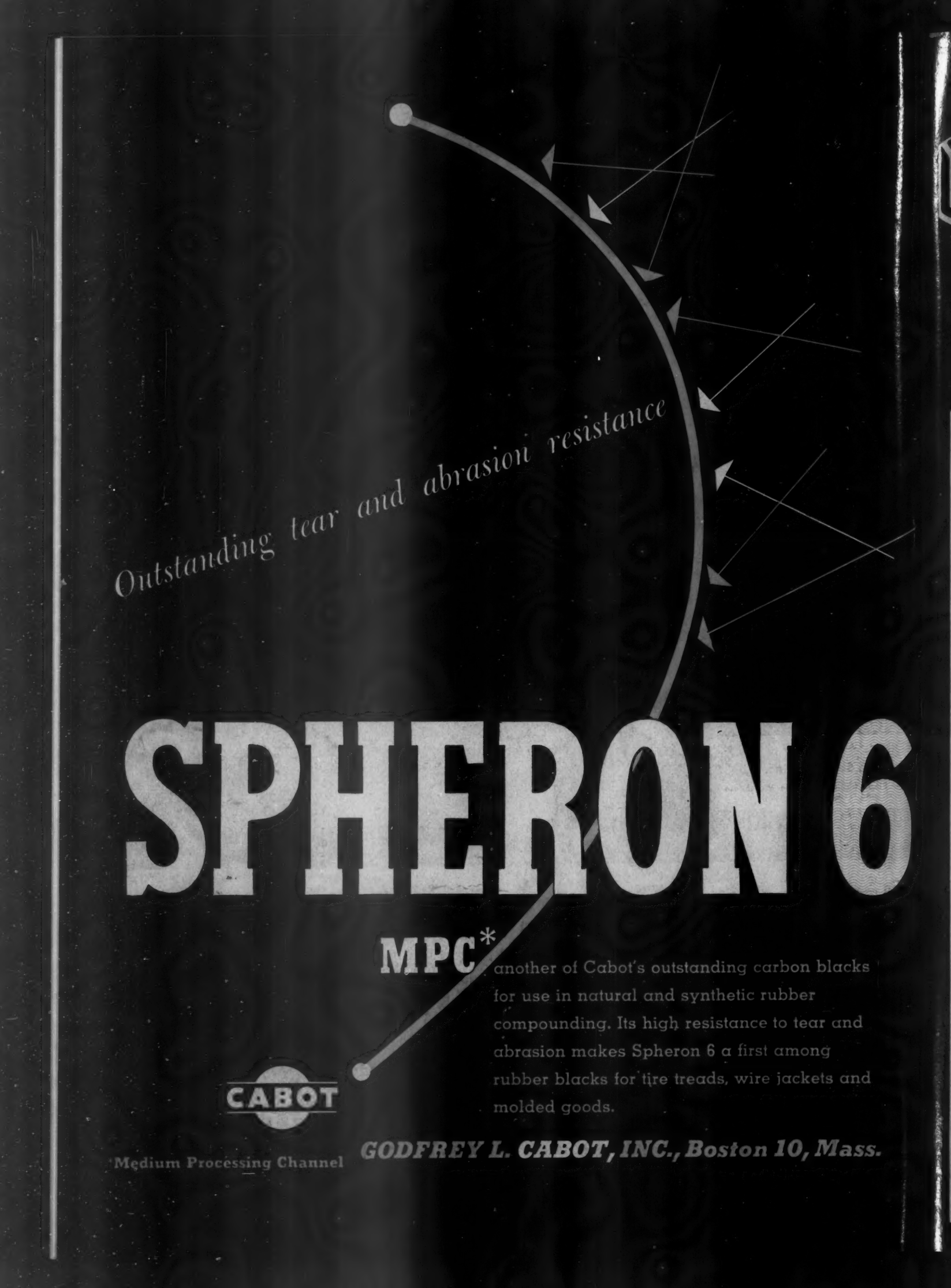
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